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BRIEFLY TOLD.

MR. OSBORN'S PAPER ON "THE RELATIVE POSITION OF CONSOLIDATED GAS AND ELECTRIC LIGHT PLANTS."—One of the papers that led to a very lively discussion (the paper and discussion will be found in our issue for last week), at the July meeting of the Pacific Coast Gas Association, was furnished by Mr. M. C. Osborn, of Santa Cruz, Cal., who wrote on the matter of "The Relative Position of Consolidated Gas and Electric Light Plants." Perhaps this subject has greater importance for the Companies on the Pacific Coast than for the Companies this side of the Rocky Mountains, because on our side of the "divide" it has received close attention for quite well over a decade, whereas on the Coast section the question has not been analytically studied for nearly so long a period. One result of this is the determination by gas investors of the district East of the Rockies, unless in exceptional cases and where peculiar conditions govern the lighting supply, that gas lighting properties not encumbered by electric lighting annexes are much more to the point financially than are gas properties which have electric lighting annexes. This opinion is based on the replies that we have had from scores of gas investors and gas engineers (either or both of whom know from practical experience, in respect to that of which they spoke) responding to the question, whether the operation of gas and electric plants was good policy, from a financial point of view. The vast majority of the repliers were unqualified in their avowal, where gas and electricity were supplied from combined plants, that gas was the mainstay when it came to getting a dividend out of the joint business. To come to Mr. Osborn's paper, however. After having read it carefully, one is quite likely to reach the conclusion that he, too, is imbued with the conviction that gas has much the better end of the proposition, since he frankly admits, in replying to the self-propounded question, "Of the two branches of the business, which does the manager prefer, gas or electric?" he says: "I would take the gas works as a business proposition, as it is my belief that electricity for incandescent lighting, generated by steam, will never be able to compete with gas and pay the same rate on the investment." The discussion that followed the paper is interesting in the extreme, and although some who took part in it, from the very force of circumstances, in that they are well (or ill) saddled with electric lighting plants, were led to making some sort of expression in favor or in defence of their positions, it is nevertheless apparent that the strong trend of the sentiment was in favor of "sticking to gas," and to gas only. For instance, listen to Mr. Burrows' opinion: "I am running both gas and electric works and will say that I found it very hard work to keep my electric business up to what it should be. * * * I hold that electricity manufactured by steam cannot compete with gas anywhere in the United States where they have the Welsbach burner in use and properly managed. I hold that no small plant *can make money on electric lights without having a good city contract.* I do not know of a business anywhere where an electric plant will pay expenses without a city contract." Mr. Petch holds "that, under ordinary circumstances, gas will be a better money maker than electric lights." Mr. Cressey found there was money in gas supply, while there was none in electricity. And so it goes, even unto Mr. Britton, who frankly declared, "The unit of candle power considered, gas is cheaper

than electric light, either by water power or steam power." Hence, after all, those on either side of the Rockies are not far apart in their belief that gas is the money maker, and that the further we go the stronger will that belief become.

MR. DECKER'S PAPER ON "GAS STOVES."—In our current instalment of the proceedings of the Pacific Coast Association is a paper on "Gas Stoves," by Mr. D. Decker. who gives therein many useful hints respecting the value of these appliances as a means of increasing the output—and particularly the day output—of all sorts and conditions of gas companies. As is often the case, the ensuing discussion was quite as interesting as the paper itself. Mr. Crockett's contribution to the debate was notably valuable, and his recital of that which was accomplished by the Company whose business he directs, in respect of securing users of gas on cooking and heating account, will undoubtedly stimulate many of his associates to go in heartily for like results. The policy adopted by the San Francisco Company of loaning the cookers is one that can be followed with profit by the smallest of companies, for the owners of the latter should remember that "loaning" is not "giving" out of hand, and it is just as easy to keep track of a gas stove as it is to keep track of a meter. We have no doubt that Mr. Decker's paper and the discussion it evoked will result in free buying of gas stoves by the "Coast" Companies.

A FRENCH EXPERIENCE WITH PREPAYMENT METERS.—At the last session of the Association of French Gas Engineers, M. Melon, of Lille, France, read a paper in which he detailed his experiences in that bustling city with prepayment meters. Lille, which is perhaps 160 miles away from Paris, is a handsome, busy place, the city proper containing 220,000 people, the surrounding suburbs holding perhaps 80,000 more. M. Melon, about a year ago, succeeded in convincing the directors of the Company that there was a likely field in Lille for prepayment meters, and he set about placing them in a systematic way. As a result, in less than 11 months 3,198 prepayment meters were set, the preponderance of the measurers going into situations that had not been supplied with gas theretofore. He reports the occupations of those taking the meters in this order, numbering them in classes: 1, wine shop keepers, etc.; 2, commercial employees, business men, doctors, engineers and students; 3, foremen and home workmen; 4, bakers, grocers, butchers; 5, haberdashers, barbers, laundries; 6, "functionaries," railway men, teachers, etc. Out of the 3,198 meters set, 951 were placed in houses that had discontinued the use of gas, but where the fittings had been left intact, and 55 were employed to replace meters of the ordinary type. The average consumption per meter per month amounted to 840 cubic feet.

NOTES.—John Brooker, for some years connected with the German town (Pa.) gas supply, died on the 13th inst.——Mr. Jas. T. Lynn, of the Windsor (Ontario) Gas Company, was fined $22, after a hearing in the local Police Court, because he "made excavations in the streets without having obtained the consent of the Board of Works." The case will be appealed. Of course "Jim" paid the fine, and it is 22 to nothing that he will get the money back. Further, it looks that he has a good case for damages against the authorities of Windsor.——An assessment of $25 per share has been levied upon the capital stock of the Gas Consumers Protective Association, of Los Angeles, Cal.

Effect of Sulphate of Ammonia on Grass Growth.

The London *Journal* "notes," that in the course of a series of lectures on botany for teachers in connection with technical education in Norfolk, Mr. T. B. Wood, M.A., furnished some interesting information as to the effects of sulphate of ammonia, nitrate and other land dressings, on crops. He stated that at Rothamsted Park, a piece of land had been laid out as pasture for a very long time; and about fifty years ago, experiments were commenced with various kinds of manure. Every six years parts of the plot were cut and carefully examined by experts. Taking the plot dressed with nitrate of soda alone, they found: Grasses, 83.5 per cent.; leguminous plants, 1.8 per cent.; miscellaneous, 15 per cent. These figures showed an increase over the unmanured plot of 12.5 per cent., while the leguminosæ had almost disappeared; and the miscellaneous stuff had decreased 5.5 per cent. Sulphate of ammonia gave the following results: Grasses, 94 per cent.; leguminosæ, 2 per cent.; miscellaneous, 5.8 per cent. Comparing these with the previous figures, it will be seen how greatly the grasses augmented with this treatment, and how the pod-bearing plants had almost disappeared. The grass that developed most of all with a dressing of sulphate of ammonia was the *Festuca ovina*, better known as sheep's fescue, which increased to 53 per cent.; this enormous amount being due to the fact that sheep's fescue is a typical feeding grass, with a large number of rhizomes and stolons well suited for light land, and also that sulphate of ammonia is not very soluble, and its effects do not reach far down. To sum up, dressings of nitrogenous manures enable the grasses to crowd out other plants. Nitrate of soda benefits deep-rooted grasses, while sulphate of ammonia helps surface rooted ones.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—CONTINUED FROM PAGE 252.]

FOURTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN SAN FRANCISCO, CAL., JULY 21 AND 22, 1896.

FIRST DAY—AFTERNOON SESSION.

The President introduced Mr. J. B. Grimwood, of San Francisco, who read the following paper on

OIL TAR AND ITS USES.

Mr. President and Members of the Pacific Coast Gas Association: As I propose to deal mostly with the tar produced by carbureted water gas plants, the title of "Oil Tar," etc., which I have given to my paper is perhaps a misnomer, though that is the name by which it is commonly known, and, indeed, what I have to say would be equally applicable to either sort.

According to Redwood and Holloway, Goulden is responsible for the statement that 60,000,000,000 cubic feet of illuminating gas are made in the United States and Canada daily, of which two-thirds consists of carbureted water gas—*i. e.*, 40,000,000,000 cubic feet of the latter. That being the case it would certainly seem as if the residual tar should come in for a goodly share of consideration by the gas maker, even if the production per 1,000 cubic feet of gas be infinitely less, its constituents of no particular value, and the tar itself subject to frequent and considerable changes in composition, due to the ever changing conditions of manufacture.

On the contrary, however, in all the gas literature which I have consulted on he subject, I find merely a passing word here and there. In looking over the files of the AMERICAN GAS LIGHT JOURNAL of the past ten years. I have brought to light only one paper on oil tar, to which I refer later, and very little else which bears upon it.

Aside from its commercial value, and supposing it to be deficient in all the compounds which make coal tar a marketable residual, there arises the question of how to dispose of it without cost and annoyance to the neighborhood.

About five years ago, when our new water gas plant was erected at North Beach, we were confronted with this problem. Since that time we have given it a good deal of attention, devised various schemes, changed, rejected and altered numerous trial methods, until we have arrived at the present reasonably satisfactory condition of affairs. In 1891 and 1892 all, or nearly all, our tar was a waste product; now we have a good and sufficient market for what we do not use.

It is my desire to lay before you at this meeting the uses to which we put our tar, and the methods employed to reduce the raw product to a state of usefulness, and to ask your just criticism of the same.

The raw tar is of no use except as a fuel. Sometimes it may be used for preserving timber or dipping pipes, but it never dries well and is altogether very unsatisfactory.

Mixed with anthracite screenings and coke breeze, it makes a very fierce fire and serves admirably as a boiler fuel—a use to which I believe it is universally put. Butterfield states that tar for this purpose may be tolerated with as much as 50 per cent. of water. In the samples I examined there was not more than 15.5 per cent. water. This was pumped from the bottom of two small settling vats, where it remains at most 24 hours.

In order to use the tar for other than fuel purposes, the water at least must be removed. This is imperative. It can be effected in several ways—either by boiling in an open vessel with direct fire, by heating with steam coils, by distillation, which can be carried still further and the tar oils separated by fractionation, or by means of a centrifugal machine, as Butterfield suggests. Mr. Theodor Petersen, in an article on the separation of water from tar (AMERICAN GAS LIGHT JOURNAL, Vol. LX., No. 24), recommends a centrifugal machine very highly, on the ground that it will not only reduce the amount of water in coal tar from 16 per cent. to less than 1 per cent., but it also removes all grit and foreign substances, thereby considerably enhancing its value. He goes on to say, it makes a better fuel when freed from water, and claims a great saving in the case of oil tar used as a fuel. "It sometimes contains as much as 19 per cent. of water."

We have adopted the method of boiling in an open vessel by direct fire. Notwithstanding the objection that there is great danger of fire, we find it the most satisfactory, and, by careful management and properly arranged boiling pot, there seems to be no reason why it cannot be successfully carried on. Our arrangement is as follows:

A cast iron, flat-bottom kettle, 30 inches deep and 45 inches in diame-

ter (containing somewhat over two barrels of tar) is bricked up in a red brick setting with a fire-brick furnace underneath and firing door on one side. The furnace is supplied with a short, wrought iron stack, which affords ample draught, and the whole is well bound together with round bar iron and turn-buckles, to withstand the expansion by heat. A 2-inch drain pipe comes off from the bottom of the kettle, and, passing through the brick wall, is supplied with a stopcock for controlling the outflow of tar. To this another section of pipe is connected by a swing joint, by which means the tar can be run in any desired direction. To guard against boiling over the kettle is supplied with an annular extension four feet high, from one side of which, and near the top, a 6-inch pipe leads back to the tar well. Thus, any foaming or tendency to overflow is provided for; but, as an extra precaution, the front and half the side walls of the setting are built up one brick thick, about a foot high, forming a wall around that side of the kettle on which the furnace door is situated. If by chance any tar should boil over on to the brickwork it could not possibly reach the fire.

Fifteen feet away are the raw tar wells, and also two for storing the boiled product. A platform and small hand pump are arranged over the former, at such a height that the tar can be pumped up and allowed to flow by gravity into the kettle through a 2-inch supply pipe. By a system of valves the raw tar is pumped from this same place to the piles of anthracite screenings close at hand, which, after being well turned and saturated, are carted to the boiler room. It requires nearly all of one man's time to mix fuel, yet he is not too busy to devote an occasional ten minutes of his attention to the boiling pot, and this being quite sufficient to keep it going nicely, the labor on our boiled tar is practically nil.

Heating the tar with a steam coil to drive off the water is certainly safe enough in so far as danger from fire is concerned. No doubt the water can be driven off in this manner, but that is about the limit of its capabilities, and leaves the tar very much too soft for most purposes, as for instance, making pavements.

My experience with a centrifugal machine for dehydration has been limited to laboratory tests. A sample of tar containing over 11 per cent. of water (specific gravity 1.16204) was subjected to 5,000 revolutions per minute for a quarter of an hour, yet failed to show any signs of separation. I might have been more successful had the sample been gently warmed, or a light oil added to increase its fluidity. Dr. Durand Woodman discusses the subject of dehydration *in extenso* in a paper published in the AMERICAN GAS LIGHT JOURNAL (Vol. LX., No. 2), for January 8th, 1894.

He says: "In the case of oil gas tar sufficient fluidity exists to satisfy the most exacting, but unfortunately it is not accompanied by any marked tendency to separate by rest. Only a small amount of water can be removed in that way.

"The application of heat not only fails to improve matters, but seems to perfect the already existing emulsion; and standing for weeks causes no appreciable separation of water." The tar he experimented on contained 50 per cent. of water, and ranged in specific gravity from 1.030 to 1.040.

Of some samples I tested, the greatest content of water was 15.5 per cent.; the least 11.3 per cent. Careful specific gravity tests, extending over a period of nearly a month, gave the following results:

1.16204	1.16204	1.16419	1.15740	1.15913	1.16179	1.16325
1.16979	1.16884	1.16930	1.16208	1.15756	1.14747	1.15883
1.12407	1.11577	1.10390	1.15109	1.14740	1.13333	1.13884

Average, 1.15134; maximum, 1.16979; minimum, 1.10390. The above tests were made at the North Beach Works. A sample taken from Potrero Station proved to be 1.15153, and samples from two other large works were, respectively, 1.19012 and 1.183807.

These figures, embracing as they do the investigations of several weeks, would indicate a fairly constant quality of tar, and I am convinced that, with proper care in the management of the generators, it can be maintained at such a standard that there will be no great trouble in finding a market for it. Of course, it must be borne in mind that the tar is a by-product and its manufacture is subordinate to that of good gas. By the use of large storage tanks the slight variations in composition from day to day are not so noticeable, as they become mixed in the greater bulk and result in a more uniform product. Mr. S. T. Wright, F.C.S. ("Gas Manufacture," by Hornby), says that tar derived from ordinary bituminous coal varies in specific gravity from 1.1 to 1.2; whether he means in the same works or not, I do not know. My investigations on oil tar show a much smaller difference. In a treatise on "Pintsch Gas," published in the London *Journal* (AMERICAN GAS LIGHT JOURNAL, Vol. LIV., No. 19), I find: "The residual tar and liquor are of little or no value, being so nearly the same specific gravity as water that the two take a long time to separate in the tanks." Woodman has already been quoted. All this seems to indicate a great diversity of opinion as to the quality of oil tar.

After our tar has been freed from water we use it either for making pavements or as a paint. If for pavements, it must be subjected to still greater heat, and gives the best results when maintained at such a temperature that the resulting pitch will be quite hard if allowed to cool. Unfortunately, I am unable to give exact figures, never having made pyrometric tests, but think 350° to 400° C. to be about right. The operation is a crude one and much is left to the judgment of the operator. We have seldom been troubled by overheating it, in which case the pitch loses its elasticity and becomes friable, causing the pavement to disintegrate rapidly.

In the matter of pavements, the tar or pitch serves the purpose of a cement or bonding material for such refuse as clinkers, breeze, etc. It is run out of the kettle while still very hot, upon a bed of the clinkers, and well mixed, when it is spread immediately, and tamped or rolled with a heavy roller. Any tendency to stick to the roller can be easily prevented by smearing the latter from time to time with a little crude oil. All of the roads, paths and pavements of every description at the North Beach Works have been made from the generator and boiler refuse, with sometimes a top dressing of breeze for the sidewalks.

Some sample blocks were made in which sand and tar alone were used. They seemed hard and smooth, but as they were never put to a practical test, I am unable to say how they would stand wear and tear.

The first of our pavement was laid in the latter part of 1893, and seems in quite as good order as the day it was put down, though there has been teaming of all sorts on it continuously. The block in front of the office building was laid in 1894, since which time several cargoes of coal have been hauled over it in carts, and on one occasion a weight of 13 tons passed over it without leaving more than a temporary mark of the truck wheels.

In most places it is laid about 6 inches thick directly upon the sand, though a bed or substratum of coarse clinkers is advisable.

The proportions in which the tar and clinkers are mixed vary according to circumstances, being approximately one barrel of the former to seven of the latter, and making somewhat over 50 cubic feet of pavement 1 foot thick, or 100 feet 6 inches thick. A liberal estimate of the cost might be as high as 5 cents per square foot laid, placing no value on the clinkers or breeze. This is far below the cost of bituminous rock or basalt blocks, with which we would otherwise have been obliged to pave some of the streets, and consequently represents a saving to the Company worthy of consideration.

The first office and essential function of a paint is as a preservative of the substance, be it wood or metal, to which it is applied, and a good article must have certain qualifications which may be summed up as follows: It must adhere closely wherever applied, filling all the pores and making an even coating free from pin holes, thus affording an effective guard against oxidation; it must not creep; it must not blister when exposed to the sun; it must withstand the effects of heat and cold, wind, rain and fog, and the disintegrating action of the atmosphere.

While well aware that paints are made for specific purposes, and the engineer who paints his holders with one sort would use, perhaps, something entirely different for other parts of the works, nevertheless, I think, for general utility and cheapness, a preparation of oil tar can be made which will be found eminently satisfactory.

The tar should be boiled for this purpose until all the water is removed and the first portions of light oils; but no longer, as subjecting it to too high a heat renders it useless for paint making. If heated to 140° the water, first light oils, and some naphthaline will be removed, leaving the solvent naphthas, middle oils (present only in small quantities), heavy oils (also found only in small amounts), and a good proportion of fine, smooth, black pitch. This residue will be quite fluid when cold, but very much too thick for paint, and it must be thinned down with turpentine to the required consistency, which will vary according to requirements. Generally the proportions will be about one part of turpentine to four of boiled tar. This can be applied with a brush in the usual manner.

Wherever the paint has been tried it has more than equaled our expectations, and is now in general use about the works, proving itself not only highly satisfactory, but a means of no small economy in the use of boiled linseed oil and ground paints.

For every 5-gallon can all that is needed is one gallon of turpentine at a cost of 47 cents, and as a gallon of the paint will cover 64 square yards of metallic surface, a great saving can be effected in painting oil tanks, corrugated iron roofs, retort house iron work when temporarily

out of use, and, in fact, everything around a works which requires protection from rust.

It can be used equally well as a priming over which to lay another coat, or directly over a linseed paint, and has never been known to blister or crack. In a neighboring town it has been used on several occasions as a roof paint, and in one case, where the shingle roof was in such a leaky condition that the owners despaired of ever making it tight again, a thick application of the paint was enough to make it proof against all our winter rains. This roof, which was badly cracked and dried, was painted last January, and though owing to its having had only one coat, it is losing its first gloss, is seemingly good for another year. The roof gets the sun from morning till night, and, with the thermometer sometimes as high as 85° or 90° in the shade, I am told the paint remains hard.

These are some of the many uses to which we have put our tar, and in not a single instance has it failed us. What we have not used ourselves we have had no trouble in disposing of, when boiled, at a good figure, and I take great pleasure in the fact that our books up to the present time show an income on tar sales of about $1,000 per annum.

Therefore, I say, it behooves us to save our tar and turn it into a source of profit, however small, making the best possible use of it at the works in the manners suggested, and endeavoring to create at least a local market for our product. Assuredly that is within the province of the gas engineer.

Meanwhile, I would lay great stress upon the importance of a chemical examination of our oil tar with a view to the possible recovery of valuable constituents. To the best of my knowledge, this has never been done with the tar from our Pacific Coast oils, which are notably different from those obtained in the Ohio and Pennsylvania field. (Applause.)

Discussion.

The President—Gentlemen, this interesting paper is evidently the result of a great deal of hard work, and I consider it a valuable addition to gas literature. Heretofore there has been nothing valuable in the way of literature on oil tar. When a man wanted to know anything about oil tar he had to learn it for himself. Mr. Grimwood has gone very carefully over the ground. His paper is certainly a very valuable one, and I hope it will be well discussed.

Mr. Eichbaum—I have always maintained that oil tar had far more value than coal tar, but the trouble has been to make people believe it, because you could not convince them of its value if it had no smell. I suppose I have tried twenty different preparations to keep paint on, among others beeswax and tar, and tallow and tar, and all sorts of ingredients. I never found anything that would stick, until in desperation I tried the oil tar, and it has been on there five or six years now. The parts of the purifier covers that rest in the water will not hold any ordinary paint because the ammonia will dissolve it gradually. After having almost despaired, and after replacing the upper part in the purifiers, about four years ago I had them painted with the oil tar, and they are just as good now as they were at that time. In fact the oil tar has so hardened by being in the water that, with two or three coats, I think the leaking would be entirely gone. The question of paint on a gasholder, I consider very important. For over three years we have put oil tar on the roofs, and it is to-day perfectly good. It actually stops leaks, without any caulking, or any other preparation whatever. I consider oil tar valuable for all purposes. We are selling a good deal of it. We pass our tar through three different submerged tanks, and in passing it along through at least 100 feet of subterranean passages it seems that the water rubs out. A gentleman who lives not far from our works experimented with oil tar, by rubbing it between two circular boards about two feet in diameter, letting it go in at the center and come out at the periphery, and by that means he rubbed the water entirely out. We have never done anything of that kind, however. We paint with it, after it has laid two or three years in a quiet state. I don't think it is any advantage to boil it. It is best to lay it on in one or two thin coats, rather than one heavy one. We have found it extremely available for the protection of iron. I don't think anything else is equal to it for the preservation of iron. It seems to stick so close to the iron that, when scraped with a knife, you can hardly tell where the iron ends and the tar begins.

Mr. Gregory—I use oil tar on the holder, and I find it very good. I have also used the light tar from the coal, which I find will paint very nicely, but the sun will granulate it some and dry it out. When it comes to the purifier covers I use petroleum oil, and it sticks closer than a brother. It goes right down to the water line, and I know of nothing that you can get into the water line of a purifier cover that will go right straight to the iron and stay there like it, and leave a vaseline covering, and that will keep away all the water, and remain there with the ammonia. In fact, I cannot see how an oil tar, if it amounts to a tar, will be free from being cut with the ammonia, and ammonia water that comes from the gas, because it cuts the tar and gets to the iron. Everything I have thus far put on leaves the iron and rubs off, excepting the petroleum oil, which leaves a sort of vaseline, and vaseline is good for everything.

Mr. Powers—I am much interested in Mr. Grimwood's paper, and probably in common with the rest of the gentlemen I have had a peculiar experience with oil tar. We did not consider it good for anything, and tried to sell it, but could not do so. We did not know how to handle it. We did not want to contaminate our regular tar well with it, so we let it run down into an excavation near the railroad track for a long time. After awhile we found that our market for tar was becoming limited, as we had competitors in the field. I finally ascertained that some enterprising men found there was tar in this hole or excavation where we had been allowing it to run, and they procured 30 or 40 barrels of tar from there and sold it. Everybody was supplied with tar, and it was supposed to come from the gas works. We had no experience with it, further than trying to burn it. I have had some experience with coal tar as a paint. We have used it for everything, and find that, suitably mixed with turpentine, it meets our purposes admirably. For the protection of the purifier covers we poured a certain amount of distillate on top of the water in cup, and since doing that we have had no trouble at all. When we use our water gas plant again I shall try and save the oil tar, subjecting it to the process mentioned here, and try to make some use of it.

Mr. Adams, of Portland—We sell our oil tar as well as our coal tar. We do not sell any coal tar; we sell tar, and we have had no complaints. (Laughter.) We have what we call separators—long wooden boxes with several compartments—and if these occasionally get stopped up we have some difficulty; but if we clean the separator out every month or six weeks we precipitate the tar pretty well. I can see no difference in the tar to look at it, but I have no doubt that upon analysis there will be found great difference.

Upon motion of Mr. Steinmann, seconded by Mr. Osborn, the thanks of the Association were tendered Mr. Grimwood.

The next paper (it was read by the Secretary at the request of the author), was by Mr. L. F. Fogg, on the subject of

TELESCOPING A SINGLE LIFT GASHOLDER WHILE IN USE.

Gentlemen of the Pacific Coast Gas Association: I have been requested by some of our members to explain to the Association the method of changing a single lift gasholder to a telescope one while in use. This work was done last October, for the Vallejo Gas Company, at Vallejo, Cal., Mr. E. C. Jones acting as Engineer, and the Bay City Iron Works as contractors.

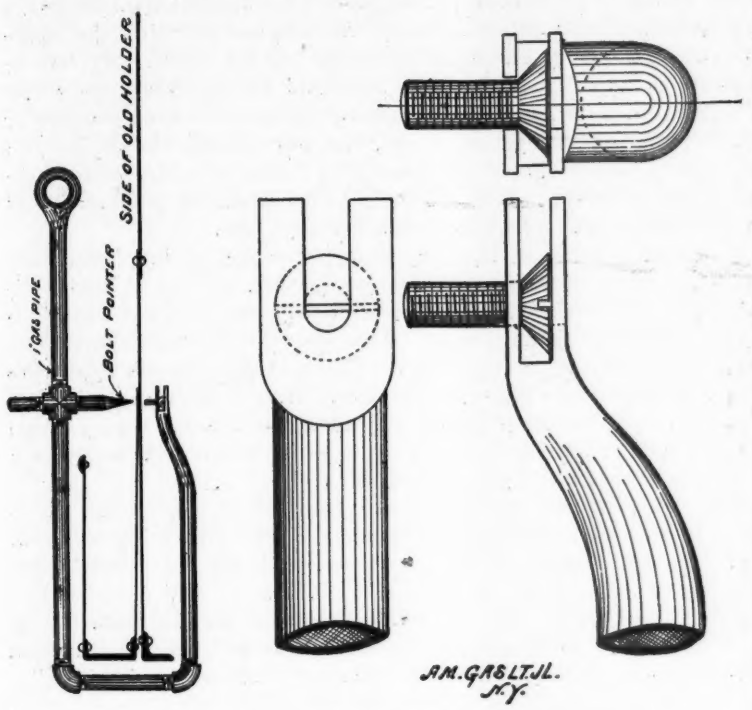
The gasholder that I changed is an old one, 40 feet in diameter by 16 feet high, with 6 columns, 12 inches by 12 inches redwood, with wooden girders.

The first thing to consider was to devise some means of keeping the holder in use while putting on bottom cup, as it was the only holder in the city and the supply of gas depended on it. By taking off the bottom rollers, which had to be done, it would leave the holder in a position where it would tip to one side and cause trouble. To overcome this and to keep it in position, we made some wooden rollers, about 8 inches in diameter, and fastened them to the columns about 2 feet 6 inches above the top of the wall, and put some pieces of 2-inch by 4-inch vertically against the side of the holder for the rollers to run on. By this means the holder was kept in proper position so that the cup could be put on.

The second and most difficult part of this work to construct was to connect the bottom cup to the old holder. I made the bottom cup in six sections, of our 4-inch channel iron; outside sheet 18 inches wide and the inside sheet 24 inches wide; the cup was made in the usual way. I riveted and bolted five sections of cup together around the old holder before connecting the same, and then suspended cup to the old holder by chains, put on a turnbuckle and drew the cup tightly around the holder, leaving a space of about 3 feet to be put in after the 5 sections had been bolted to the old holder. The holes in cup sheet had been punched, and with a breast drill I drilled through the old holder, and by a simple machine, hereinafter described, I put the bolts from the inside and nuts on the outside. After it was all properly bolted, I put in the remaining section and bolted it up complete. In building the cup, the top inside sheet that bolts to holder is 2 inches smaller in diameter than the bottom channel. The reason I did this was to leave

1 inch space all round between bottom channel and old holder to put in bolts and rivets at splices.

The third thing to do was to lengthen out columns and build staging across from one column to the other above the old holder to carry outside lift while being constructed. I then proceeded to build the lift



Device for Bolting Cup Sheet to Old Gasholder.

above old holder in the usual way that they are all built, and after it was completed and rollers all on, and the top rollers of the old holder taken off, I lowered it with blocks and tackle fastened to each column. Great care must be taken not to let the old holder get out of level in lowering or entering the new lift over old holder. By this process of enlarging the storage capacity of any gasholder, I calculate it costs about one-third less than it would cost by putting in a new brick tank and single lift holder, not counting the saving in extra ground required for an other holder. All these things should be taken into consideration, as small gas companies have to economize in every way to put their plant on a paying basis; and, in my estimation, this is one of the principal points where a small gas company can save if they wish to enlarge their storage capacity.

Machine for Putting in Bolts for a Gasholder.—This little machine for putting in bolts, which is a very simple one, is made of 1-inch gas pipe, U-shaped, with one end flattened down and split in half and a slot in one half of end. The bolt is slipped into this slot and put down underneath holder and up on inside; just opposite the bolt a cross is put on pipe, and, by means of a pointer, the hole is located, so there is no difficulty to enter the bolt from the inside of holder.

Discussion.

The President—Gentlemen, I think Mr. Fogg has displayed altogether too much modesty in writing this paper. I went to Vallejo and found that the gasholder tank had been constructed of sufficient diam eter to admit of double-lifting or treble-lifting the existing holder. I suggested to the superintendent that, by putting a double-lift on his holder, he could double his capacity at a very small expense. I believe he consulted the people at Mare Island, who informed him that it was an impossibility; that it could not be done. He afterward went to Mr. Fogg who undertook the job and completed it to his entire satisfaction. As he proceeded with the work, Mr. Fogg was obliged to invent tools to perform it, one of which was this tool described in this paper for bolting the cup on to the bottom sheet of the holder—something that has never been done before, I believe. I think the paper is particularly interesting to the small gas companies, and hope it will receive its merited discussion. Can Mr. Wilson tell us something about it?

Mr. Wilson—I am sorry that Mr. Thomas is not here to-day. I can only say that the cost of a new holder would have been anywhere from $5,000 to $7,000, and the bill for this work was about $1,500 and some $200 added to the contract price. We were very well satisfied with the work, particularly with the price.

Mr. Clements—I visited the works at Vallejo on Saturday last and was much pleased with what had been accomplished. It was a revelation to me, and I can certainly see that any small gas company can accomplish a great deal in the way of capacity by following the plan there adopted. The manner in which it was constructed throughout, from beginning to end, was certainly wonderful, and it is worthy the consideration of anybody, while it reflects great credit on Mr. Fogg's originality as a mechanic.

Mr. Fogg—I calculated to make it a first-class job, and I think it is as good as any that can be done. I think there are many holders in California that could be treated in the same way.

Mr. Adams, of Portland—How did you punch the holes for riveting on the cup?

Mr. Fogg—In the first place, we punched the holes in the original cup with shears upon its inner side; in the old holder we used the brace drill and bored right through it.

Mr. Burrows—Was it necessary to keep the holder full during the time the cup was being put on; or was it allowed to rise and fall at night?

The President—The holder was allowed to rise and fall. There was but very little attention paid to it until very near the completion of the work.

Upon motion of Mr. Britton, a vote of thanks was tendered Mr. Fogg for his instructive paper.

The President—The next paper is on

GAS STOVES

by Mr. D. Decker, of Fresno. As Mr. Decker is not present, the Secretary will read it. The Secretary read as follows:

Electric lighting stations diagrammatically express their load factor during the time of operation, and indicate the greatest output of current by the term "peak load." This expression owes its birth to the resemblance to mountain peaks that a diagram shows of varying conditions of demand, and the highest peak is the greatest demand. This expression is both terse and comprehensive, and has found a place in our already intelligent and expressive vocabulary.

A few years ago a diagram expressive of the output of gas from a central station would picture one mountain peak of gigantic size, rising suddenly and precipitously from a serene valley (and which might fitly be called the valley of depression) and as suddenly and precipitously falling into another valley of equal serenity. To overcome this short, sharp peak, and to accumulate force enough to scale it within two or three hours, the energy of the previous hours of a day was required.

Within the last decade this hump on our otherwise fair landscape has had for company in its solitude three or four others of varying sizes with smaller valleys between, and the ascent of "the peak" is no longer the extreme effort that it was. The gas man's idea of the milennium is a day when his, to borrow a Hibernicism, "peak load" will be diagrammatically expressed by a straight line. Then will there be the proper conservation of energy and the utilization of what are now waste forces that tend to disrupt the proper economical proportioning of active agencies in the manufacture and distribution of his commodity.

To accomplish the result dreamed of should be our aim, and the best means of that accomplishment our study. Since God proclaimed *fiat lux*, artificial illumination only becomes a factor when Luna rules this sphere, and the dollars invested in providing artificial light must, to level the peaks, find a means to that end. Any demand that can be created during hours of sunshine for a consumption of gas is the beginning of the result, and heat and power furnish the means; and, in the preservation of the interests committed to his care, it becomes at once the duty of every manager of a gas plant to discover within the confines of his territory an opening for that demand, in order that the interest burden to be returned may, like that parable in Holy Writ, receive from the master of the house the commendation, "Deserving."

The attempt to increase day consumption, while receiving spasmodic notice, has not had that concerted attention which it merits, and the purpose of this paper will be to awaken latent thought in members to the end that, upon their return to their own vine and fig tree, they may cogitate and determine to devote at least a few waking moments to this most engrossing subject. There is no business in the commercial marts that waits for dollars to be dropped into the expectant palms of investors, but the gas business; and, in our western vernacular, it is becoming necessary that in that respect we "get a move on."

The proper way to introduce gas stoves is a much mooted question to-day, as it always has been; and it is the stone wall at which most gas men sit and stare. Once they clear it, there is usually a fair field

beyond. This question, as Gen. Hancock once said of the tariff, is a purely local affair, and must be decided in each case by its own exigencies; but it must be decided, and speedily. Let an assumption be made here of the different methods, and then results contrasted.

The energy of gas managers of olden times was largely devoted to the payments to stockholders of an annual dividend of 20 per cent. on an assumed capital stock, and every other interest was dominated to that accomplishment. Demand at exorbitant rates for the new illuminant made it only necessary to manufacture all that could be made to meet demand. When coal oil and gasoline were introduced in competition, and thus became factors in light, and the horizon of our hopes was darkened by the forbidding and awful spectre of electricity, let loose from the jar of God knows where, then the gas man bestirred himself, when his rates and dividends were perforce reduced. to find other markets for his product, and gas for power and fuel became the talisman. It is regrettable, but nevertheless true, that some gas men of our Association are still grasping in the outer darkness of a 20 per cent. expectancy, and, while pondering ponderously, electricity steals quietly into his fold and robs him of the chosen of his flock.

The best method of introducing gas stoves, as I have stated before, is a local question. Let us canvass, however, results of two or three methods; but before doing so let us reason together.

To obtain a gas consumer, a company is ordinarily willing to lay 100 feet of main and set a meter. The investment so made, to obtain a problematical result, amounts to say $25; from sources of information, I glean that, in usual companies, investments in mains and meters represent an outlay of $50 per consumer. If a gas man could be assured of an increase of 100 per cent. in his consumers and his output by the investment of double his capital he would not take many thinking hours to decide, and if at 50 per cent. of his investment he could double his output, his joy would be hilarious, and for 25 per cent., delirious. Yet such results can be obtained. If you have to give away stoves, your investment for an ordinary four burner, two-oven stove, would be $15, and for a water back, $25, placed. From companies imparting me knowledge I learn that the average consumption of an ordinary gas range amounts to 1,200 cubic feet per month. Assume gas at $2.50 per thousand, and do a little arithmetic. Say you put out 100 stoves; investment, $1,500; interest, 8 per cent., $120; total, $1,620. Revenue on 100 stoves, on an assumed consumption of 1,200 cubic feet per month, $3,600 per annum. Gross profit, $1,980. From this you can all figure your own profit, and to this conclusion there seems to be no answer. Assume once more that you have 50 consumers to a mile of main; doesn't it impress you that for each gas stove placed on existing mains you increase your sale per mile just that much, and lessen just that much your per cent. of leakage, and increase the earning capacity of your plant.

The gas men have in their possession to-day the lamp of Aladdin, but stand before the cave of treasure, trembling and crying with fear of demolition from a pursuing phantom, and yet afraid to rub the lamp that will give the fortune. The gas stove is the gas man's hope, and he should pin his faith to it.

It matters little after all whether the stoves are rented, sold or given away. What you want to do is to get them into the houses of your customers. Study your own situation. Begin, if you please, on a proposition of lowering rates to compete with any predominant fuel and success will crown your efforts.

In almost every business men are willing to spend large sums of money in advertising, and attracting thereby public notice to the article they have for sale, and on a stock of goods anticipate, or are satisfied with, a return of 10 per cent. per annum over and above ordinary expenses. It may be fair to assume that in giving away stoves we are spending that amount of money in advertising; but, on the other hand, it is not every company that is financially able to give away 100 stoves. Then the plan of selling at cost suggests itself, or the bearing of one half of the expense with your customer who is going to immediately return you a fair percentage on your investment.

The use of gas for purposes of power and heat will before long absorb all other means to the same end. The masses of people require education in its use; first, to overcome grounded and groundless prejudices which have been cemented by 50 years of constant abuse from an ignorant and at times a venal press, and also to overcome the stupidity, if nothing worse, of irresponsible servants. But all this or more is possible to the gas man of to-day, for his whole life and education consist in overcoming prejudices and smoothing the wrinkled brow of the careworn consumer, who makes his own life and others miserable by a too serious contemplation of a gas bill.

The slogan of the gas man should be "no smoke, no ashes;" and he can prove that economy belongs to the use of his commodity. The best seller of a gas stove is the contented consumer. Careful scrutiny should be given to each stove before placing. It should be kept in repair and adjusted occasionally. The amount of gas should be contrasted with the amount of coal used for the same purposes. When the mercury is running riot and trying to climb over the top of the glass, the energies of the attractive gas man should be devoted to expatiation on the merits of a stove that heats without heating the cook and polluting the atmosphere by a too frequent deposit of smoke on the walls. My fellow-laborers in the vineyard, you may look hard for an undue percentage of unaccounted-for gas, you may attempt to squeeze more cubic feet or candle power out of a pound of coal, you may minimize labor, but you are missing that nugget of silver and gold if you fail to introduce a demand for gas stoves; for it is the mine of wealth, the panacea for all the ills that the gas works has fallen heir to of late.

It is remembered no doubt by many members of the Association when gas stoves were first placed on the market, and it will also be remembered how inefficient and unreliable they were as a rule, and it is a good deal the prejudice created by the use of inefficient stoves that we are compelled to-day to counteract. The rapid stride in gas appliances is best evidenced by a glance at the advertising column of a gas journal of to-day, and a contemplation of the catalogues that one receives from manufacturers; and the major portion of these are devoted to that hump that I first called your attention to.

And now, in conclusion; when you get home, make a diagram similar to the foregoing suggestion, the first being an ideal one, and the second resembling yours, and say to yourself, before the next meeting of the P. C. G. A. "I will have a line that will nearly approach the ideal." Then will be said unto you by your Directors, "Well done, thou good and faithful servant; thou hast been faithful in a few things, thou shalt be ruler over many things."

Discussion.

The President—I am sure the question of day consumption is very near to every gas man's heart, and I hope that every one will add his mite to the discussion.

Mr. Crockett—We are having quite an experience with gas stoves. At the time I suggested to our people the loaning of stoves I did not know that thing was being done in Paris. In connection with Mr. Eichbaum's Company, we had been struggling along for a great many years with gas stoves and found it almost impossible to do anything with them. We could sell gas grates, but when it came to cooking ranges it was impossible to sell them at all. I looked over our Company's books only to find we were losing about $500 per month in trying to put out gas stoves. We tried in every way to induce people to buy them, but we were always met with the objection that they already had a stove and did not want to pay for another. I then suggested to our people we should try the experiment of loaning gas stoves. They said to me, "How much is that going to cost?" I said, "$50,000." They said, "That is a tremendous amount of money." I said, "We will show you how much every gas stove ought to burn, and we will write off 25 per cent. every year for losses, and even then we should make a profit ranging from 25 to 30 per cent. on the investment." They eventually concluded it would be a good business to engage in, and we thereupon ordered a large number of gas stoves. Previously, in two years, we put out only 237 gas ranges of different sizes, but within six months after we started on the loan system we had applications for stoves so far ahead that it was impossible to fill them. We put out 1,250 stoves in less than six months, and we could have put out more than 2,500 if we had had the stoves in time and had sufficient men to put them up.

Our system has been this: When a customer applies for a gas stove we have his account examined on the book in order to ascertain if he is a good customer and one who is responsible. We make him sign a receipt on the book for the stove, agreeing to return it in case he wishes to cease using it, in fair order, barring reasonable wear and tear. Every time he moves from a place he must notify us. We found that plan worked very well. After we had invested about $50,000 we concluded to stop for a while, not because we do not believe in it (for we do thoroughly believe in it), but in order to ascertain how many of these stoves would come back to us, and in what condition, as well as to ascertain what the extra cost would be in case we had to reset them. We do get the stoves back occasionally, some people saying they are too expensive, while others move, and still others go to other places. We have people coming to the office to-day begging us to let them have stoves again. Since we have ceased loaning gas stoves we find that we can sell them. Last week we sold 22 ranges, which would

have been a phenomenal business a few years ago. It simply shows that people have got into the way of using them and insist on having them. A while ago I mentioned the reports of the Paris Gas Company, and I see that Mr. Jones has made an abstract from the report, which is as follows:

From an abstract of the report of the Paris Gas Company for 1895, it was shown that the total amount of gas sent out was 10,979,126,000 cubic feet, an increase of 360,049,000 feet, amounting to 3.3 per cent. The day consumption for the year 1895 was 3,326,338,000 cubic feet, as against 3,086,180,000 cubic feet for the year 1894. The day consumption was 30.29 per cent. of the total consumption, while 67 per cent. of the total increase for the year was in day consumption. Some time ago the Paris Gas Company adopted the plan of gratuitously loaning gas stoves, and, during the year 1895, there were so placed 39,439; at the end of the year there were in use, on the loan system, 214,386 gas stoves. That shows what they are doing in Paris. Of course, Paris is a very large city. The gas stoves that have come back to us which we had to clean and repair, have occasioned us very little difficulty, because we immediately take off the nickel plated fittings and dip the stove in lye, which cleans every portion of it thoroughly. Then we blacken it again and the stove is perfectly good and ready to send out at once. The only place that we see any particular loss is in the tin drip pans. Many times they come back in such bad condition that we have to retin them. Our experience with gas stoves is very satisfactory, and as soon as we move from this office we intend to go into the business immediately, and pursue it as arduously as we did before. I think our experience is a good lesson to every gas company. You can do it if you will take care of them. We have a man who goes around and examines the stoves, teaching people how to use them and handle them, and at the same time we keep track of them. We have our numbers on them, the same as we have on the meters. We have an account of them and where they are, and we have not lost any stoves yet.

The President—I believe Mr. Osborn, of Santa Cruz, has adopted the plan of loaning gas stoves.

Mr. Osborn—I can't say that we have exactly a plan of loaning stoves. Upon going to Santa Cruz I found the people there knew nothing about gas for fuel; it was a strictly electrical light town, and the gas mains were not extended much in the residence district of the town; in fact, there were few mains in the outside districts. I have placed 31 gas stoves this summer and they are giving perfect satisfaction. But I doubt the advisability of continuously loaning gas stoves, for this reason: As Mr. Decker said in his paper, if you get one consumer on every 100 feet of pipe you may consider yourself well off. In the small towns and these garden places the residences are three or four hundred feet apart, and the consumers must put up some of that cost, because the company cannot be expected to do it. A stove will cost between $15 and $16. That is, the stove will cost me $12.25, set down in our town, and it will cost $3 or $4 to set it up, on an average. It is true you are extending your main system all that time, but the question of loaning gas stoves is a large item of expense. It would appear to me that there should be a cheaper stove gotten up that would do the work. A gas stove is a fine piece of furniture as compared with a wood or coal range, but I think that something more economical would do better. In our climate, for about nine months in the year, it is cool in the morning, and it requires a fire to tone up the air. Everyone of these stoves that we place can be used as an auxiliary to the wood stove, and I have found that it works successfully. They can work it up in connection with the hot water back in either stove, and they can use it in connection with the wood range. I have a case where two families are cooking on one stove, and use two meters. When the lady of one family gets through she turns off her meter, and the other turns hers on, and they are all happy.

Mr. Crockett—A small stove that is used as an auxiliary can be purchased for $7. It has two holes on top, a boiler and a little oven. They have been brought out recently, and they can be used to great advantage where coal or wood stoves are used.

Mr. Steinmann—We had between $8,000 to $9,000 invested in stoves, and loaned them out to consumers at 50 cents a month. Those who used the stoves for cooking purposes used them right along, while those who used them for heating purposes only use them in the winter months only, and we have not charged some of them for the stoves. We found that after five or six years' use they would say that we ought to give them the stove, and we did so. Now we sell them at cost and put them in. We run pipe and put in the stove, and are supplying stoves with perfect satisfaction where ladies are doing their own work. Where they have a servant we hear some complaint. We have a demand for stoves with two burners, for about $3, and three burners for about $6. We are putting them in at actual cost. At a recent meeting of our Board of Directors, they discussed whether it would not be a better plan to give them out for day consumption on separate meters, and where we are selling gas now for $2.50 we are considering whether we cannot give it for cooking purposes at $1.50. I am inclined to think we will try that at Sacramento, because it is very warm there, and there are a great many shop people who want a quick fire. I think we have from 1,500 to 2,000 stoves in Sacramento now, and by offering extra inducements we can increase the daylight consumption.

Mr. Gregory—We fasten a two-burner stove right on a wood stove, and they work in conjunction. I set the stove up for about $5, including piping and everything of that sort. We think we will get our gas down to about $2.25 in the fall.

Mr. Wharton, of Fairhaven, Wash.—In considering gas stoves we have to look after locality, or rather the conditions which confront us in a locality. We have a great deal of lumber on the Sound, being surrounded by a forest of trees. There are numerous saw mills right in our cities, and the refuse and slabs from those saw mills are retailed on the street at 75 cents a big two horse load, delivered. It makes splendid fuel, and we consequently have a great competitor there in the way of wood. Our Company took up the introduction of gas stoves three years ago, and I zealously worked to push it, and with much energy. I first tried to sell the stoves, and found it was absolutely impossible with us. I then brought the matter before our Directors, who allowed me the privilege of renting the stoves, and after pursuing that policy for a short while I found it would not work. I then asked them to permit me to donate the stoves, which they allowed me to do. Our first year I put out 36 stoves in one season, furnishing them and setting them up without any expense. In the winter season they require more heat in the kitchen than a gas stove will give, and they came back to us, because it makes it very expensive to use a gas heater in connection with the wood, where the latter fuel is so cheap. It has consequently been a very difficult matter for us to push the gas stove interests. In May last I started in with renewed interest, and I have this season only worked these auxiliary stoves of two or three burners, and during the summer I put out about 50 of them, with fairly good success. We charge, at our plant, $1.75 for fuel gas, and $2 for a light supply, and even at $1.75 per thousand as fuel, in competition with wood (and desirable wood, too), we find that gas for fuel is not a success. One reason why we do not have greater success with gas as fuel is that the climate with us is cool, and some artificial heat is desirable even in the summer mornings. That is one reason why you people down this way, and more particularly further south, have greater advantage over us, in your warm climate. I have not had an opportunity to test the consumption of a gas stove, for the reason that when one goes in with us it is an auxiliary stove, and the gas range is not used exclusively. In three instances, however, I had a chance to make that test, because there is no other stove in use where they are used, and I think I have a record here of those three. One of those consumes $50 worth per year, one $42 worth, and one $36 worth, with gas at $1.75 per thousand. The $42 instance was in my own residence, and there it runs much higher than an average of 1,200 feet. It runs over 3,000 feet on an average.

Mr. Crockett—We set about 500 meters on these stoves when we first put them out. We estimated the consumption would be about 1,250 each per month. When we got the meter statements in, we found the average about 1,140 feet, after going over them very carefully. That was the average consumption of the stoves that we had meters on.

Mr. Britton—In Oakland we have considerably over a thousand stoves that are on separate meters. The average consumption for the last three years has been between 1,100 and 1,400 feet per month per stove. Some stoves having water backs run up to $10 or $12 per month, while others do not consume more than 50 cents worth per month, where they have light teas and luncheons. As Mr. Decker said in his paper, they will average about 1,200 feet per month per stove. In Oakland we put up a stove at a fixed price. We tried all sorts of plans and now place a 4-burner stove for $12, that is all connected and with a separate meter, making separate runs necessary from the front of the house, or from the kitchen drop, as we can get the best pressure. During June we placed 89 stoves and the month of July will reach about the same figure. Our increase in stoves for the past year, up to June, was 280. We sell gas at $1.75 per 1,000 for that purpose. We have done no special work except to advertise them. We did have one extra solicitor in the month of June, and for that month only. We find that one poor stove will do more damage to a gas company than a dozen good ones will overcome, and it is necessary to see that a stove is in thorough

working condition and that it is properly adjusted for the variable pressures. In San Francisco it is of course variable, but it is not so bad in our city—of course there are variable pressures, depending upon the size of the mains, etc. I have taken out many old stoves and given people new stoves for them. I have often forgotten to enter up the amount of the bill where I found that the person was a good talker and advertiser. In that way it pays.

I don't think small gas companies can afford to put out capital in stoves as can be done in San Francisco or Oakland. In these latter places the companies have a surplus capital which invested in stoves brings them good returns; but it is too much to ask of a little company, that is jogging slowly along, to invest $4,000 or $5,000 and get back only a percentage on the cost. Careful attention to your stoves, scrutinizing them carefully before they go out, and looking to them afterwards, will produce good returns. I make it a point to pay special attention to them, and of sending to every place that I hear the least complaint from about a stove, and I give them any part of a stove that is injured. I let a man spend a whole day in adjusting that stove. Doing that will sell more stoves for you than all the advertising you can do. We have found that a pressure of 15-tenths answers all purposes.

Mr. Burrows—I would like Mr. Adams to give us his experience in Portland.

Mr. Adams—My experience in Pottland is that it has been a failure thus far. We started to rent stoves and charged them at cost price. Now we propose to adopt the plan of giving them away, and before we get through I am in hopes that we may be able to get a few stoves at work. I think we have about 200 ranges connected with separate meters, but we should have about 2,000. We can get wood at $2.25 a cord, and between the cheap wood and the careless Chinaman it is very hard to introduce gas stoves.

Mr. Powers—An important question arises in connection with this subject about which I would like to make an inquiry of Mr. Crockett, as he has probably had the most experience. We have recently reduced our price and made a uniform rate for fuel and light. Heretofore we have had a different rate for fuel gas, and we have set a fuel meter invariably. The question that now arises with us is as to whether we shall continue the plan of using or setting a separate meter for fuel, which of course adds to the expense; or shall we make gas at a uniform rate for fuel and light, using only one meter? It is quite an important matter to us, and I would like to hear the views of Mr. Crockett upon the subject.

Mr. Crockett—I would say that when we contemplated this thing we originally had the idea of selling gas at 10 per cent. discount for power and fuel; but when we loaned the stoves we found we were going to invest a great deal of money, and then came to the conclusion that, reducing the cost to $1.75, when loaning the stoves to people, we would make no difference in the rate, and we did not set so many meters. In our contract we simply have it stated that they agree to pay us at the rate of $1.75, in consideration of our loaning the stove to them. The agreement is here, if you would like to look at it.

Mr. Osborn—That is a very important item, and it is a question in my mind if it pays to set the second meter. An ordinary stove requires a five light meter, and your expense is nearly one-half more in setting your stove, and I doubt if the half a dollar more which you get for your illuminating gas would pay you for that work of extra piping and meter connection. It will not pay. An important question is getting the consumer thoroughly acquainted with the gas stove. I always make it a point to go myself and teach them every point about the stove, and if it is possible to take along a very nice steak and broil it for them; they are delighted with that. That is a good plan. They are delighted with it in our town, and I am satisfied that not one of them will be taken out this winter, and they are all delighted with their stoves.

Mr. Gregory—I would like to ask if it is necessary to set more than a three light meter for every stove.

Mr. Osborn—Several companies recommend five lights.

Mr. Clements—Mr. President, I have not had very much experience with the gas stove, as we have plenty of cheap fuel in our little place. We have every condition that would prompt us to put the work forward if it were not for the fact that wood fuel is so much cheaper than gas with us. Our gas is pretty high, being pretty well up in the Sierra Nevada, at the hot end of the Sacramento Valley, where the thermometer ranges to 110, and it would not be very much of an effort to get a lady to take a gas stove and use it. In our town we have usually put in a gas stove by running the extra service and making no charge for that. I was very much pleased to see that our friend Osborn has displayed his usual energy in setting up these stoves. Since our organization was perfected, Mr. Osborn has shown himself to be a hard worker, and I have ever known him to be a wholehearted and generous man. I find that he has gone every other member one better by giving his customers a beefsteak. (Laughter)

On motion of Mr. Clements, duly seconded, a vote of thanks was tendered to Mr. Decker for his paper.

The President—We will now listen to a short paper on

THE EVOLUTION OF THE GAS METER,

by Mr. C. H. Dickey, of Baltimore, Md., one of our Eastern members. As Mr. Dickey is unable to be with us this year the Secretary will read his paper.

The Secretary here read Mr. Dickey's paper, as follows:

It is no easy task to write on the Darwinian theory of the gas meter. We ask ourselves at times. I dare say, "Why was it ever made, and for what purpose is it here?" Could the meter speak to the public it would, perhaps, ask the same questions; but as it is only tin and brass, poor thing, it cannot give expression to such sentiments, and remains discreetly silent, allowing the great public—the innocent public—to ask such questions for it.

To most people it is a puzzle. All kinds and conditions of people have treated this wonderful piece of mechanism with contempt; and, taking the experience of all the energetic gas engineers, and, in fact, all connected with the gas interests in this country, volumes could be written of the immense trouble caused by this harmless, yet most useful, tin box called the meter. Trouble to the housewife by the unthinking head of the family, who finds fault with the size of the gas bill, without stopping to think that, perhaps, a ton of coal has been saved during the month, where a dollar or two extra has been expended in the use of the gas stove. Trouble to the fair and lovely girl who keeps the hall light burning late at night while she sits in blissful ignorance of the time in the darkened parlor with her future helpmate for life. They need no meter, and they forget the existence of this creature in the cellar. They need no light except that emanating from their own souls. "Two hearts that beat as one," they forget that, perhaps, Mamma is reading above, and that the hall light in addition is consuming gas slowly, but surely.

And so I might go on enumerating many causes why trouble to the gas meter is brought about; but, true to its standard, it is ever indul gent, and I am sure regrets the everlasting trouble that is heaped upon the long suffering gas man.

The existence of the meter, to most of our people throughout the length and breadth of this land, is known only as a device to rob and plunder them of their hard earned money. Could they but pause a moment and reflect, as the meter can in the silent hours, and review all the stages it has gone through to bring it to its standard of perfection, they would, without doubt, realize that it is a wonderful thing.

The question can be safely asked, "What does our merchant, and in fact, any one having the slightest business knowledge whatever, mean by such a lack of knowledge of the very first principles of business?"

All things are done in decency and order, from the farmer who tills the land to the great merchant who ships his goods throughout all the land. Measure by measure, weight by weight, we buy our flour, coal, and, in fact, everything required for the household consumption, on faith and trust in the man with whom we are dealing.

All things are measured out to us, and in sober thought is it possible for any one to believe that a meter will not fulfill its destiny with that honesty with which only a perfectly constructed piece of mechanism can do?

"I am a thing of many parts,
But I cannot capture hearts,
Because I simply tell the truth.

"I am ever in the cellar on my shelf,
And have a very good opinion of myself,
Because I simply tell the truth.

"When servants stay up late at night,
Or papa comes in just a little tight,
I cannot help but tell the truth.

"And so it goes the whole year round,
I am indeed a register profound,
I tell the truth, because I must,
And from that truth then comes the dust;
Be it silver or be it gold,
It is the price at which the gas is sold."

The meter can with truth and honesty say that it would never have been brought into existence had not the progress of the 19th century

brought forward to the public the use of gas, which, from its early stages to the present time, has been one continuous growth; and to-day that industry has reached a magnitude far in advance in all its appointments of any other business of the world.

The subject of lighting and the use of gas for various purposes of to-day has placed it where it belongs, and given to the gas meter that assurance which all more or less devoutly wish for, a long lease of life.

It is particularly interesting to me at this time, in writing this paper, to have you note that I am a Baltimorean! and to the credit of Baltimore belongs the first gas charter ever issued in these States, in 1817, although, like all new inventions, it was a few years before practical results were demonstrated. Through the courtesy of Mr. H. C. Slaney, I am informed that the first meters known to be manufactured in the United States were made in the city of Baltimore, in the year 1832, and from that early conception of the necessity of registering gas, by which the old wet meter was used, with its numerous disadvantages, there sprang an industry that has grown to its present proportions, and presents the gas companies to day an absolutely correct measure for the gas given to their consumers, which is without doubt the most fair and equitable registration for goods sold that exists to-day in any branch of the manufacturing industry.

From the early stages of the old wet meter there sprang into life, in the early fifties, what is known as the slide-valve, dry gas meter.

Again, the first station meter found its birth in Baltimore, in 1826, when a meter, 48 inches in diameter by 26 inches long, was sufficient to register the gas at the works of the company.

You will, therefore, readily see why a Baltimorean is more or less proud of the situation in the gas industry, as his city has seen the first gas charter, and witnessed the gas meter born into these United States, in the city in which he dwells.

It will be useless for me to take up your time in enumerating the various attempts to produce the gas meter in this country—the ups and downs of the enterprising men who undertook to manufacture these articles; but it is sufficient for me to congratulate all the enterprising manufacturers of this country on the success to which this article, so grossly and unjustly condemned by the public, has been brought.

In its high grade of material, its perfection in workmanship, and in the honest conviction of all connected with the gas industry that fair, honest and just rights are meted out to the public by the gas meter, they are to be congratulated, notwithstanding the public protest to the contrary. (Applause.)

On motion of Mr. Britton, duly seconded, the thanks of the Association were tendered Mr. Dickey for his paper, on which there was no discussion.

The Chair then announced the appointment of Mr. John A. Britton as the representative of the Association at the exhibition of gas appliances, to be held in New York in 1897.

Another Telegram.

The Secretary then read the following telegram of regret from ex-President Quilty:

San Jose, Cal., July 21, 1896.

E. C. Jones, President P. C. G. A., San Francisco, Cal.: Critical illness wife prevents my attendance. Best wishes for successful meeting and high-class banquet. (Signed) C. W. Quilty.

On motion, duly seconded, the Association then adjourned until 10 o'clock of Wednesday morning.

Second Day—Morning Session.

The Association was called to order at 10 o'clock, with President Jones in the chair.

Communication from the Ohio Association.

A communication from the Ohio Gas Association, signed by Jerome Penn, President, was here read by the Secretary, expressing regret at being unable to attend this session of the Pacific Coast Gas Association.

The President—We will now listen to the reading of the paper by Mr. John A. Britton, of Oakland, Cal., on

MUNICIPAL OWNERSHIP.

Gentlemen: Municipal ownership, in its broadest sense, means much more than most of us are inclined to consider. Like the rocks of a barren coast that confront the seamen unexpectedly from a fog enveloped atmosphere, municipal ownership stands out as a menace at the present time to all industries, and, by reason of the peculiar condition of American finances, practically surrounds them by the fog of uncertainty.

East of the Rocky Mountains, this subject has engrossed the attention of the most careful thinkers in the gas and electric lighting professions, and has awakened the eloquence of all who deem it their duty to protect the industries which have been committed to their care.

Within the past two years, literature on the subject of municipal ownership has assumed vast proportions, and constitutes, at the present time, a library of itself; on the one hand, the opponents presenting clear, lucid and argumentative reasons why it should not exist, backed by figures unanswerable in their exactness; the library of the proponents, on the other hand, consisting of vapid mouthings of monopolistic degradation of labor, gold trusts and the usual tirades against capital, whether existing in corporate or individual hands, declaiming of the helpless laborer, and resorting to the clap-trap of political speeches to influence the public mind.

"Municipal ownership" should be termed "Municipal Theft;" for, reasonably considered, it can be classed in no other way. It is nothing more or less than legitimatized confiscation of property, and in a manner and by a means that if resorted to as individuals against individuals, would be sufficient ground for the use of force of arms to resist. It is simply monstrous and intolerable.

Municipal ownership has developed into a disease upon the body politic, and, in common with diseases of the human body, should be properly diagnosed to determine the cause that the remedy may be at hand.

I am free to confess that municipal ownership owes its birth largely to the intolerable and intolerant charges that have been exacted in times past by some corporations. The collection of wealth in the hands of many or few needs at the present time an apology from any fair thinking citizen of this Republic, and that the desire for the accumulation of unwarrantable wealth from the masses is responsible to a large extent for the present agitation cannot be denied.

In the assumption, however, of such a condition, it does not in any manner relieve the public of the onus of the attempt at confiscation, unwarrantedly, of properties in which they have no share, and are entitled to no special benefits from.

The agitation of municipal ownership comes as a rule in all localities from the unthinking masses, who are lead by demagogues having a desire for power, and not from any good which may accrue to the State, county or municipality in which they exist.

It is a truism that the true laborer is never an agitator. The busy hands and active brains engaged in the amassing of a sufficiency for the support of those dependent upon them have no time to waste in the discussion of questions involving the abridgments of the rights of others.

The idle hand and irresponsible brain are pregnant with imagined wrongs, and from them come the agitations which move the foundations of government and society.

As a rule, opposition to general legitimate interests is the ill-fashioned and untimely born child of jealously, nurtured in the womb of despair, nursed at the breast of passion, and cradled in the home of dissatisfaction, becoming as a rule, in our free government, a horror to contemplate.

That one man or class of men should, by a superiority of brain power, rise to prominence or wealth, seems to this child of jealousy unwarranted and unnatural. From the low depths of his intelligence it does not seem possible that one man should surpass another.

He becomes a firm believer in the maxim that all men are created free and equal, and it does not occur to him that the creation on an equality does not forever determine the position of men or capital. It is more than a difficult task to discuss at the present time this question of municipal ownership.

The subject has within the past month received more than the usual attention given to any public subject, both at the hands of Associations similar to this, and at the hands of Associations having interests like ours in common.

At the meeting of the Western Gas Association, held in May last, it was exhaustively discussed by the brightest minds in the profession, and again, at the meeting of the Street Lighting Convention, held in New Haven on June 18 and 19, the major portion of the time of that convention was devoted to a discussion involving this subject; and right here it seems becoming to invite your attention to the differences existing between the Western Gas Association and the Street Lighting Convention, in the manner and methods of the discussion.

The Western Gas Association presented and discussed this serious question in papers and arguments that were dignified, courteous and conservative, as became men of mark, having millions entrusted to their care, and as became men who had known what it was to stand in

the ranks of labor and, step by step, to find their way, by their own efforts, intellects and advantages, to a position where they were called upon to preserve the capital which protected them as laborers, and as men who had the welfare of those associated with them, from the lowest to the highest, at heart—such men as could be safely trusted with the government of the nation, and who are respected because of the positions into which their genius has led them; for nature is the most exacting equalizer of all, and finds for men the proper level to which they are entitled.

Look back upon that picture and then at this, and contrast with the conservativeness, the dignity and the courtesy, the vapid mouthings of one who read a paper before the Lighting Convention, who consumed the time and patience of those who listened to him with a dissertation upon the dishonesty of men; who started out to make an argument by the condemnation of those who happened to disagree with his ideas; who seemed to think that every man associated with any corporation was dishonest by nature, by birth and at heart; and who was apparently sincere in what he said. It was his belief, at least.

And because men, particularly during the past 40 years, have been compelled to listen to such rantings and mouthings from every irresponsible crank, who consider that every man, woman and child associated with corporation interests are dishonest, untruthful, and devoted principally to the obtaining of money under false pretenses, it seems to me that it is time for the maligned gas man to arise, assert his rights and his prerogatives, and take steps to prevent that wholesale abuse of him which is becoming offensive and unwarranted. The animadversions of treacherous foes should be silenced, and in such a way as to be unmistakable in its character.

To discuss "Municipal Ownership" calmly, in the face of the abuse showered upon the fraternity, is well nigh impossible, and to consider a proposition whereby a government proposes to impair the obligation of a contract arouses, naturally, antagonistic feelings, disturbs the body politic and paves the way for the disruption of all that seems secure; and yet, when the subject is considered in all its lights, the impairment of the obligation of a contract is precisely what is meant, and nothing more or less, when a municipality presumes to enter into a business that it has already agreed shall be performed by another.

The granting of a franchise or right, which in this State at least is regarded as property and assessed as such by every assessor, implies the right to transact the business for which the franchise is granted, subject, however, at all times, to the proper regulations of the municipality by which it is granted. And in the pursuance of the rights so granted it is common for individuals or corporations possessing such right to expend, in the business for which it is organized, sums of money commensurate with the demands of the municipality in which the business is situated.

Works are built, more or less costly in their nature, pipes are laid in the ground, poles or wires extended in the streets. Men and women who have implicit faith in the justness of our free American government invest their money in the stock of such corporations, and are justly entitled to receive a reasonable return upon the same, and no more.

They have implicit confidence in the provisions of the laws which they or their ancestors have made, and which are intended for the preservation of property interests.

They believe in that fundamental principle of American government which states that confiscation of property, without due compensation therefor, is forbidden; and yet, what nearer approaches confiscation of property without due compensation than the opposition of a municipal corporation in a business that can never be classed as one of the necessaries of life?

By such ruinous competition, begotten in the hot-bed of anarchy and communism, destruction of property of citizens of the municipality must and does necessarily ensue; and yet the intelligent, but unthinking, taxpayer sits idly by and allows the property of his fellow-man to be taken from him without a protest, caring only as long as his interests are not disturbed. The selfishness of mankind is responsible for most of its injustices.

I am neither a prophet nor the son of a prophet, but I venture to predict that, should municipal ownership of the luxuries and unnecessaries of life become established, the frightened cries of multitudes will ring out from the desolation of destroyed municipalities, when, by the looting of mercenary politicians, this fair land is stripped of its beauty and sustenance and becomes a prey to the hungry hordes of office seekers who know no other law than that of self.

The proposition of the assumption by governmental bodies of the control of all the functions now performed by private capital is an outrage upon common justice and common sense, and will have a greater tendency to disrupt our boasted commonwealth than any other factor that can be introduced as a disturbing element, and the guarantee of personal liberty must be withdrawn.

It seems to me that this question has been discussed too mildly by the adherents of invested capital, and that the arguments have been based upon a comparative showing of the cost of a plant municipally conducted and one conducted by private control, and that too little stress has been laid at all times upon the rights possessed by capital, however invested.

The man who has by daily toil developed his muscles, he of the broad back and strong arm, who, by the sweat of his brow, makes bread for his mates, rates himself at all times as a capitalist entitled to his *per diem*, and the rate of his earning capacity represents his value to the world. His ability to control a certain stipulated revenue is the basis of his worth, and he is always paid what he earns in the measure of his capacity.

From a contact of nearly a quarter of a century with the laboring classes I make the assertion that at no time is labor compelled to wait on its earning capacity for its due reward. The honest, sober and industrious laborer can and always will find a market for his commodity, which is his brain and muscle. The irresponsible laborer, the man who frequents the beer hall, who loafs about the corners of the streets, who spends what little he earns in debauchery and the gratifications of the sensual appetite, who sacrifices his manhood to his passions—he is the man to declaim largely on the injustice of capital, grinding monopolists and corporations; and he finds a ready mouthpiece in that irresponsible element of society whose hand is against every man's. But the honest laborer, whose home is his palace, whose wife and children are his sole thought and pride, finds no reason to declaim on street corners or in beer halls against the capital which makes his home possible.

If the laborer, therefore, is entitled to his interest on his value, the clerk, the cashier and the manager are entitled, by reason of their grades of responsibility, to the interest on their values established by the exigencies of their positions, I submit, by what right, legal or moral, can that capital, which makes the employment of labor possible, be deprived of its just right to earn an adequate return; and yet that is just what municipal ownership means—a deprivation of the right of capital.

If I were a lexicographer I would have to define municipal ownership as "An arrogant assumption of supposed power," for there is no rule of God or man that justifies the course now being adopted at the behest of the ignorant few to the detriment of the many.

Not very long ago I had occasion to discuss at one time the side of capital in opposition to confiscation, before the Board of Trustees of the city of Alameda, and feeling that arguments I had occasion to make at that time are, and always will be, applicable to this question at issue, I submit a few of the statements then made.

It is a usual thing for any municipality to invite and encourage any business which may bring to it capital and the employment of labor, and any action of any government which would drive from its midst such capital and such employment of labor is certainly to be deprecated.

The engagement by municipalities in industries, which properly belong to private capital, would tend to the throwing out and breaking down of any attempt on the part of capital to interest itself in the building up of a city.

The protection of capital and the protection of labor are duties of governmental bodies far above and beyond that of any other sphere in which they may work. The destruction of capital means the destruction of labor. The protection of capital means the protection of labor. One is as much dependent upon the other as the life of plants is dependent upon the sunshine.

If it can be reasonably demonstrated that municipal capital, wrested from the property owner, and which has been acquired by him through his own exertions and toil, can be used again to his benefit, then no argument can offset it; but if, on the other hand, it can be proven that the wrestings of the earnings of labor are to be used by political bodies for that which cannot result in benefit to the average taxpayer and land owner, then I say, and say positively, that no board of trustees, council or board of supervisors, controlling any district, has a moral or legal right to take that money and use it for the benefit of the few to the detriment of the many.

The history of municipal ownership throughout the United States and in Great Britain has been a record of misrepresentation of facts, made, not by governmental bodies, but by interested employees, whose

desire to make a favorable showing, with reference to the cost of industries engaged in by municipality, leads them to pervert facts, to present arguments which are fallacious, and, to speak plainly, in most cases absolutely devoid of truth.

Viewed in the same light as a commercial enterprise, it of necessity devolves upon the employees in charge to be the guides and mentors of the city authories, who must necessarily trust to the judgment and opinion of the employees, and where employees are interested solely in holding their positions it is but human nature for them to err; and, I might add, it is divine in the taxpayers to forgive.

The lethargy, the indifference, the don't-care-itiveness of the average taxpayer accounts for the financial distress into which our city governments run.

I have sufficient faith in human nature, and in the average politician, and in the citizens elevated to a position of trust, to believe that they are generally conscientious and painstaking in the discharge of the duties of the trust that devolve upon them; but in this connection it is also human nature for them to put off upon the shoulders of others such tiresome and perplexing duties as they may not be capable of attending to, or to which they have not the time to devote.

As then stated, I have no faith in the ability of men constituting the board of trustees of any city that the business of lighting could be conducted by them in an honest manner.

The history of municipal works and their conduction by municipalities is a history of fraud, injustice and dishonor. There are a few exceptions, but the burden of taxation that must be submitted to by every taxpayer bears me out in this assertion.

It will be conceded by every man, whether opposed to or in favor of municipal ownership of the necessaries or luxuries, that could any municipality be conducted by one man having dominant power in all departments, that the taxes upon property could be lessened by at least one-half.

There is probably no business in existence that admits of a greater opportunity for leakage than the lighting business—none that requires more care, more exact supervision in its operation; and it is unreasonable to suppose or hope that any body of men devoting one or two hours per week to the government of a city can give the attention to such a business which it demands.

They must of necessity be governed altogether by the men whom they have in charge and whose tenure of office depends upon the temper and digestion of the board governing.

A man with a defective stomach is apt to do at times, by reason of his indigestion, acts that in better moments he regrets. The body politic just now, it occurs to me, is suffering from an extreme case of dyspepsia, and when, by some manipulation of divine providence, that is corrected, and the body restored to its normal condition, the things which it has done under the guise of good government will be like the phantoms of a nightmare, to be regarded in sober moments only with horror and dismay.

The injustice of a municipally conducted lighting plant seems to me to arise from the fact that the consumer who does not consume, by reason of inability or disinclination, is compelled to pay for the luxury which his neighbor enjoys, and a luxury that the neighbor is better able to pay for than he. Municipally conducted lighting plants are paid for at the expense of every taxpayer within the limits of the municipality. Unless each one enjoys equally its advantages, it is apparent that an injustice is being done.

The city of Alameda can be cited as an instance of this gross injustice. The cost of lighting the city and of supplying incandescent lights at various houses and residences can be summed up at about $1,000 per month. With a population of 12,000 people it represents $1 per year to each taxpayer.

By the records of the town not more than 400 people are at present enjoying the benefits of illumination by electricity.

The extra cost, over and above the ordinary expense of street lighting for a city of that size, amounts to $4,000 per annum. It is costing the city, therefore, to furnish each of the 400 consumers of electric lights $10 per annum, and each inhabitant of the city is contributing his quota to that to supply a luxury to the few who are favored by the officers of the government.

I have carefully read all the literature obtainable upon the subject of Municipal Ownership, and find much to commend in Mr. M. J. Francisco's pamphlet entitled, "Municipal Ownership and its Fallacy," published at Rutland, Vermont; and I commend to every member of the Association the careful perusal of its pages, as also the masterly paper of General Hickenlooper, read at the last meeting of the Western Gas Association.

I believe municipal ownership of lighting plants should be forever stamped out of existence by legislation. I do not believe that any municipality should under any circumstances be permitted to engage in any business which does not admit of a benefit to all. I believe that corporations should be controlled in their actions so that no reason could be given to the most fair minded for a consideration of the question of municipal ownership.

In the pamphlet by Mr. Francisco, copious comparisons are made between cities operating municipally and those having contracts with corporations, and always, as it always will be, to the detriment of the municipality. But among them all, no better comparison exists than in our own State between the first city to be municipally conducted and the adjacent towns.

In a published pamphlet, issued within the last 30 days, the Municipal League of the city of Alameda, organized for the purpose of sustaining the trustees in the stand they have taken respecting municipal ownership, publish a statement to the effect that the city has been paying, for the past 100 months, $1,082,85 per month for 88 arc lamps for street illumination. The hours of lighting for these lamps are by the moonlight schedule, until 1:30 A. M., and average 125 hours per month. This amount (which is admitted by the League in favor of municipal ownership) represents a rate of 9.8 cents per lamp hour.

The Oakland Gas, Light and Heat Company has just concluded a contract with the city of Oakland, for one year, by which it agrees to light the arc lamps in that municipality, all night and every night in the year, at the rate of 45 cents per lamp per night, or 3.7 cents per lamp per hour. By this comparison, Alameda is paying nearly three times as much for its light, municipally conducted, as the city of Oakland is paying for its light by and under private contract.

It seems to me that no argument other than this is necessary to show the absurdity of the claims of municipal ownership leagues that a city can light its streets cheaper than it can by private contract.

It is a safe assertion to make, in view of the published facts of municipal control, that in no city in the United States to-day is lighting, either for streets or residences, furnished by a municipality as cheaply as it can be furnished by a private corporation; and as the plants in existence continually deteriorate, and the taxpayer is compelled to bear the burden of extensions, additions and repairs, the cost per thousand feet for gas, or per arc lamp, furnished for street illumination, will continually and constantly increase, and the municipality lose in addition the revenue by taxation from invested property.

As a member of the Pacific Coast Gas Association, I deem it my bounden duty to warn the members present of the coming of this dreaded disease. It is an epidemical wave that must be met sooner or later by us all; and can only be met with a positiveness and aggressiveness that will make the people of the State of California feel that industries such as ours are entitled to the protection which their investment merits.

In conclusion, I can do no better than to quote to you from the address of our Past-President, Mr. C. W. Quilty, on this very question, wherein he stated:

"Municipal ownership and control tower above all other dangers to investment."

"It arises like a dismal fog and dark cloud in the night, and from God knows where, and then is begun a feeling of despair and imminent doom."

"Wherever there is a wrong, Blackstone says there is a remedy; but in a case of this kind there is no remedy."

"The question of municipal ownership presents a grand, alluring, kaleidoscope scheme, which partakes of socialism, paternalism, popularism, and the theory of equality and fraternity." (Loud applause.)

Discussion.

The President—We have listened to an exceedingly interesting and carefully prepared paper on a subject which has threatened to affect the vested interests of gas companies all over the United States. I suppose the companies east of the Rocky Mountains have had more trouble of this kind to contend with than our companies on the Pacific Coast. This question should be thoroughly discussed, and I trust the gentlemen present will take it up. I see we have with us this morning Mr. Cline, of Los Angeles.

Mr. Cline—This subject has not been brought up in Los Angeles, and I have had no experience with it. By keeping down the price of gas we endeavor to keep the minds of the Council off from this subject; but, as Mr. Britton says, I don't know how soon it will strike us. I think the matter has been very fully treated in the paper.

Mr. Powers—I was very much interested over the reading of the

article. We can all see that the paper has been prepared with such care that it treats the subject exhaustively and well. I have had a little experience with municipal ownership, and confess that the question is a startling one. It makes no difference how much we condemn it and say it is wrong—it is coming; it is confronting us. Each one of us will have to contend with it sooner or later. I have not the least doubt of it. The majority of the people in any municipality, or any commonwealth, are not all intelligent. They are not all honest; consequently we will have to meet those questions. Some of you know that Southern California, and San Diego as well, is a pretty dry country, naturally. A few years ago some men organized a company to furnish the city with water at great expense. Some two weeks ago, by two thirds majority, the city voted for a new water plant, entirely forsaking that plant and property that built them up from nothing to a city of 20,000 people. That is municipal honesty. They want municipal ownership. The question of municipal lighting came up before now, and was carried in one of the city boards. Like Congress, we fortunately have two boards—one with a little more sense than the other, and perhaps a little more honesty—and the question failed. If it had gone to a vote of the people the matter would have carried, and we would have had municipal lighting. Now then, gentlemen, there is some reason for this. You all agree with me that we occupy public property with our poles and wires. We occupy the streets of the city without compensation. Of course, we are giving something that is of general benefit, but the public, who don't recognize that, say we get paid for it and get our money out of it. The question is, what are we going to do? We can fight it, but we will fail. We may educate a few people, but we can reach only a few. The gentlemen who were here yesterday and heard the statement made by Mr. Crockett with regard to the Paris Gas Company, and had your minds on that subject, as I had at that very moment, can see the solution in a moment. What is it? It is municipal partnership. If we are occupying the streets of the city, and we have certain rights given us without paying for them, we should recognize that fact. If we paid for that right, and in return had a certain permanent franchise granted to us, wherein the corporation pays its share to the municipality yearly, and when the charter has expired it pays to have its exclusive franchise again established, that, in my opinion, would be a solution of this question. You are all acquainted with the "Sand Lot Constitution" of California, and know under that we could not do it. That document says that no exclusive franchise shall be granted, and at the same time it says that every municipality shall regulate the rates. If by some means we could effect a change so that we could obtain a franchise and be protected in our rights, so that we could get a reasonable interest upon our investments, the Paris plan might be adopted here and the question be met; but under the circumstances, where a municipality has the right to regulate our rates they can scale our prices whether they think we are making money or not, and in the event that that is not satisfactory to them, they can vote to issue bonds and put in a plant, and now when it has gone so far that the Populist element has captured one of the great political parties of the country, and forced its principles upon it, what are we to do in some of the small towns where we are at work? If by any means we could impress upon our law makers the fact that we are willing to give a portion of our receipts to the municipality if they will grant us protection and regulate the quality of our light, at the same time regulating its price, but giving us a fair return upon our investment, and whenever they want our plant taken out pay to us what we put in, that will solve the question. We must protect ourselves in this matter, and we can but agree with every word that Mr. Britton has suggested in his very able paper. If we can adopt this principle of municipal partnership we will find the solution of this whole trouble. It can be brought about in other States where they have no such Constitution as we have here. In this State I think "Sand Lotism" is probably still in the majority and we must yield to it.

Mr. Britton—Mr. Cline stated that by cheap rates they have been enabled to keep down the question of municipal ownership in Los Angeles. That will not work up here. For some 17 or 18 years we have been supplying the city of Alameda with gas for the same price we have been selling it for in Oakland. According to the size of the city and its consumption, no private company could have made and furnished gas at twice the price that we charged, and sold it at a profit on the investment. That fact was entirely disregarded by the city trustees. When we made an application for a franchise for electric lighting, we offered to light the city at 50 per cent. of what it was costing them by their books; and although it was not worth at that time 5 cents on the dollar, we offered to buy their plant of them. They afterward threw the plant away (that plant cost them about $40,000), and put in a new plant in Alameda. We made this application for a franchise, which was denied to us as well as others. In speaking on a paper yesterday I said that many of our ills were traceable to the man who sold the apparatus. The city of Alameda advertised a few years ago for street lighting. We put in a bid, and a gentleman by the name of Lloyd also put in a bid. He got it, and immediately went to work and sold the plant to the city. From that time commenced "municipal ownership." If a legitimate corporation had obtained control of the lighting at prices that were reasonably fair, I do not believe the question of municipal ownership would have been taken up. But they were induced to take it up on the ground that they could sell it for so much less than anyone could furnish it to them. A municipal corporation is like a man that invests money in a losing venture, and he wastes dollar after dollar trying to get back the original investment; but the city has the poor taxpayer to foot the bill to preserve in fat offices some demagogues who prate of municipal ownership.

Mr. Collins—I think the quession of municipal ownership in the East has been so fully discussed by men who have been thrown in contact with the question that the ground has been thoroughly covered, and their experiences have been given so that they can help the Pacific Coast Companies. The question to my mind is the local questions that exist on your Coast. You have those experiences and can benefit by them. I agree with Mr. Britton that there is only one way to treat this question really, and yet I think that all the ends should be gathered up and worked on at the same time. I think that the people should be educated, and I think the people who vote should be induced to put better men in the board of supervisors and such places—practical men who can think in an intelligent way. Of course that is a very hard thing to do and it takes a long time; but all of those things count up, and, put together, they necessarily help. Dr. Powers, of San Diego, says, "No, thank you," to municipal ownership. Cleveland, Ohio, has had experience enough, and I heard a discussion on this question at the Western meeting, in which the preponderance of evidence was rather in favor of Mr. Power's proposition, that municipal partnership was a very good thing, and it worked very successfully. I think it is a very fair way of dealing, and it may avoid a good many of the arguments about municipal control of works. Personally I have never had any experience on the question of municipal ownership.

Mr. Burrows—I have had no experience on municipal ownership, but there is one point, which has become almost a fad with me, that I think would regulate this matter to a certain extent. Our laws permit everybody to vote without any interest they may have in the result of the election. If we could procure such amendments to our constitutions and laws that, in voting bonds or money over stated amounts, it should only be participated in by taxpayers, I think it would meet the question to a certain extent. Taxpayers that are paying out on any considerable amount of property are a little chary, and think a little before they do it. The masses will invariably vote for anything that will make work. If the balloting for the issuing of bonds or the spending of money could be confined to those who are paying taxes only, or an assessment on a certain amount, I think we would have less trouble and less talk about municipal ownership.

Mr. Gregory—I think the shining lights of the gas companies should invade the halls of legislation and then we could probably prevent the confiscation of property by municipalities. It has been suggested that laws might be made for the municipalities to enable them to buy out the companies; at least not to permit them to confiscate the property without some return.

Mr. Miller—I suggest we pass a law that a municipality shall not engage in the business. I think there is just about as much probability of passing such a law as there is about changing the laws or the constitution.

Mr. Holberton—I noticed by the papers the other day that the city of Mexico have advertised for a lighting plant, and it is specified that they shall purchase it at the end of eight years, and if the purchase price cannot be agreed upon they shall agree upon some experts who can agree. If it can be done in one place I should think it can be done in another, and I believe it is done in some of the Eastern States.

Mr. Collins—Although that proposition does not confiscate your property, it brings the question up again in another place, and finally all the troubles are gathered and concentrated in different ways. I refer to the proposition of the city buying the works at the end of a stated period. That may prevent the confiscation of the property, but it does not prevent its purchase.

Mr. Miller—If a law was passed to that effect, I should like to have

some six months' notice so that I could sell all the gas stock that I had, for the gas owners would be left with a poor property.

On motion of Mr. Parker, duly seconded, the thanks of the Association were tendered Mr. Britton for his very able paper by a rising vote.

(To be Continued.)

On the Dissipation of Energy Caused by the Armature Currents in Electrical Machinery.

By Dr. Otto T. Blathy, in *Electrical World.*

During the last two weeks I have had occasion to investigate the load losses in a certain type of dynamo machine, the results of which, together with a few conclusions, are as follows:

Two identical direct current machines, type C 40, of Ganz & Co. were coupled together, one being used as a motor, the other as a generator. The characteristic features of these machines are:

Type C 40, nominally for 110 volts and 400 amperes at 450 revolutions; has six poles, each of which embraces 185 mm. of the periphery. Outer diameter of armature, 500 mm.; inner diameter, 300 mm.; axial length, 400 mm. Bore of field magnets, 512 mm. The armature has 96 slots, each 30 mm. deep and 7½ mm. in breadth, each slot containing four wires of 5.6 mm.; 32 coils give 110 volts; complete symmetrical winding; 96 sectors in the commutator.

The resistance of the armature at 27° C. is 0.006 ohm.

Resistance of the shunt, 19 ohms.

Maximum exciting current, 4.2 amperes. At 450 revolutions, 110 volts and 405 amperes in the armature, the working losses are distributed in the following manner:

Friction and air resistance	730	watts.
Hysteresis and eddy currents (running free)	880	"
Exciting energy at 4.2 amperes	460	"
Armature loss due to ohmic resistance	985	"
Load loss	740	"

This dynamo gives an efficiency at a full load of 92 per cent., while omitting the load loss 93.5 per cent. would be obtained.

A series of experiments were made upon this machine to determine the dependence of the load loss on the strength of the armature current, on the number of revolutions and on the field strength. One machine was used as a motor, the other short circuited and only weakly excited, sufficient to maintain an adequate current in the short circuited armature. In the second set of experiments the two armatures were connected in series and one used as a motor, the other as a dynamo with equal current, consuming energy supplied to a third dynamo having its armature likewise connected in the circuit of two machines after the plan first suggested by Dr. Hopkinson. In this manner the working loss was directly measured and is with far greater accuracy determined than if one measured the whole of the energy supplied to the motor by the dynamo. By this method it is only necessary to consider the average of the potential difference at the dynamo and motor, 110 volts. The appended table gives from among a large number of experiments the probable mean values. An inspection of the table shows that the load loss is nearly proportional to the square of the armature current; under otherwise similar conditions, it is nearly proportional to the speed of the machine with small as well as normal field strength. That the load loss with short circuit, therefore small field strength, is really greater than with normal potential, and therefore a strong field.

These results also permit of a conjecture as to the expression relative to the nature of the load loss. The same appears as work of demagnetizing the iron; that is the amount of work due to Foucault currents and hysteresis; this quantity increases almost as the 1.75 power of the current and at a rate somewhat greater than the number of pole reversals, but would be naturally smaller in a magnetized body of iron subjected to other influences (here the strength of the magnetic field of the machine) than if the armature currents by which the losses are produced are in full effect.

Number Revolutions Per min.	Armature Current.	RI^2 Armature Loss.	Load Loss.	Load Loss. RI^2	Remarks.
154	410	1040	350	0.34	Armature Short Circuited.
136	590	2150	1050	0.49	
280	410	1020	760	0.74	
287	570	2000	1500	0.75	
455	400	960	1140	1.19	
446	570	2000	2300	1.15	
540	410	1050	1450	1.38	
590	590	2180	2970	1.36	
266	422	1070	460	0 43	At 110 Volts.
345	395	940	550	0.58	
468	375	850	660	0.78	

RI^2 is calculated with a consideration of the small variation of R, due to temperature variations.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The proprietors of the Danville (Va.) Gas Company have decided to grant a discount of 10 per cent. on all bills paid within 10 days from time of presentation.

The Sub-Committee of the Committee on Light of the Richmond (Va.) City Gas Works, was instructed some time ago to determine the quantity of gas used annually in and about the public buildings of Richmond. The result is that, for the past year, the quantity so used amounted to 24,045,200 cubic feet.

A mortgage deed for $100,000 was recently filed by the Rome (N.Y.) Gas Light Company in favor of the United States Mortgage and Trust Company, of New York, as additional security for $100,000 worth of stock taken by the latter corporation. The security consists of 100 bonds of $1,000 each, which will mature in 30 years, from August 1, 1896. They are payable "in gold coin of the United States, of the present standard of weight and fineness, bearing interest at the rate of 6 per cent. per annum, payable in like gold coin semi-annually on the 1st days of February and August."

The Auer Light Company, with a capital of $300,000, has been organized in Ottawa, Canada; Mr. C. S. Taggart, of the firm of C. B. Taggart & Son, who is one of the promoters of the organization, has been appointed Manager. The Company is in full operation.

Last week we printed the figures at which the Wilmington Coal Gas Company, of Wilmington, Del., and the Wilmington City Electric Company, signified their willingness to carry on the public lighting of that place. The authorities having considered the same, determined to accept the proposals, based on a five-year contract from both Companies, but the number of lights that each is to furnish has not been agreed upon. The contract will expire December 31, 1901.

The old plant of the Santa Barbara (Cal.) Company will not be dismantled. The new plant is fully up to the guarantees given by its contractors.

The authorities of Sacramento (Cal.) have authorized the Capital Gas Company to light the court house and jai of that city for the ensuing year by means of electricity. The rate agreed upon was 6¾ cents per 1,000 watts.

A correspondent writes: "I note your recent references to the petition of the projectors of the Sioux City (Iowa) Gas Light Company, for an extension of their charter for a period of 20 years, from Feb. 26, 1899, on which date the Company's present charter expires, and venture to send you the following account of the meeting of the City Council when the petition was acceded to. Ald. Siman moved the adoption of the resolution assenting to the petition of the Company. Ald. Chesky took the floor in favor of the motion. He said only one thing had occurred to him which he thought should be incorporated in the resolution. He had often heard it said that a franchise of such value as this at some future time should bring a revenue to the city. Conditions 20 years from now would possibly change, and it would be well perhaps to insert in the resolution that the city would have power to derive some revenue from the Company. Ald. Magee strongly opposed the resolution. He said it was only three years until the present franchise would expire, and these were bad times for the Council to enter into a contract. He said the Council had not had time to get an expression from the people, and until such expression was had he would have to rely on his personal views. He was opposed to the resolution because he thought the laws did not give the Council power to make such a contract. He cited the case of the Capital City Gas Company, of Des Moines, and declared the Council would get into the same trouble over rates if it granted an extension of this franchise. He said it would take away the Council's power to regulate the charges the Company could make. Ald. Siman replied in favor of his resolution. He said the terms were not unfavorable, because the Company would employ a large number of men in relaying its mains. He understood it was employing about 100 men now in making extensions, which extensions in some cases might not be profitable for years, and which were only being made because the city did not want the Company in the future to disturb the permanent pavements that were to be put upon certain of the streets. He had taken pains to find how the people stood on the question, and nobody had objected. They thought, to the contrary, if any favors were granted this Company was entitled to them, for it had never shown a niggardly sentiment in dealing with the pubiic. Ald. Tredway said the times, of course, were hard, but the resolution would

not affect the city's finances, either present or future, since there was no danger that the Council would not be able to regulate prices at all times, because the ordinance specially provided that it should have such power. If any improvements were made they would not injure the city, because they would be made at the Company's cost. The resolution was then put to a vote, and only one negative was recorded—Ald. Magee voting, no."

MR. CHARLES F. GUNCKEL, at one time prominently identified with the affairs of the Middletown (O.) Company, died some days ago. He was in his 59th year. He was prominent in local banking interests, and was also largely concerned in the manufacture of paper.

THE Indianapolis (Ind.) Gas Company has removed to its new offices in the handsome building known as the Majestic, recently completed by it at the junction of Maryland and Pennsylvania streets. The building, we are informed, was formally opened on the 20th inst. It is a credit to the Company and an ornament to the city.

MR. R. J. ARMSTEAD notifies the public that a certificate for 13 shares of stock standing in the name of M. W. Armstead, deceased, on the books of the Portsmouth (Va.) Gas Company, has been lost.

IT is said that the proprietors of the Hanover (N. H.) Gas Light Company have determined to surrender their charter and dismantle the works.

THE new gasholder of the Newburyport (Mass.) Gas Company is to be located at Flat Iron Point.

OWEN COLTON, for many years a trusted employee in the West Side works of the Providence (R. I.) Gas Company, died very suddenly about a fortnight ago.

THE Fall River (Mass.) *Globe*, of recent date, said: "Steady progress is being made toward the consolidation of the two local Gas Companies. The Board of Gas and Electric Light Commissioners, who sanctioned the general scheme of consolidation, declined to allow an increase of the capital stock above $400,000 to $500,000, as petitioned for, and refused to allow an issue of bonds. All the old certificates of stock are being called in as rapidly as possible, and the formal work of consolidation will soon be accomplished. For the present at least it is very probable that the big improvements determined on will not be commenced, but they are essential and will have to be made sooner or later. If the mills were running the total amount of gas consumed here this summer would equal the amount sent out in the winter months."

THE following is from the Montreal (Canada) *Star:* "The question as to whether, under its charter, the Standard Light and Power Company has power to lay gas pipes in the streets of Montreal, without the consent of the City Council, was submitted to two eminent lawyers, and both gave an affirmative opinion. The charter gives the Company the following rights: 'The Company may manufacture and deal in electricity, gas and other illuminants, and all appliances for the supplying of the same or connected therewith, and may lay its wires and pipes underground, as the same may be necessary, and in so many streets, squares, highways, lanes and public places as may be deemed necessary, for the purpose of applying gas and electricity for light, power and heating, the whole, however, without doing any unnecessary damage, and providing all proper facilities for free passage through the said streets, squares, highways, lanes and public places while the works are in progress.' To the question, 'Has the Standard Light and Power Company, under the above section, power to lay gas pipes in the streets of the city of Montreal without the consent of the City Council?' the following replies have been received:

"'My interpretation of the section of the statute above cited is that it grants to the Company the power to lay its wires and pipes underground in streets, squares, highways, etc., independently of the municipal authorities, and this law makes no exception for the city of Montreal. Section 25 of the above mentioned statute was repealed at the last session of the Provincial Parliament. This removes the doubt which might have arisen as to the extent of the municipal control contemplated in said repealed section. The St. Henry Light and Power Company, with its charter now amended, in the exercise of its privileges is only submitted to the general rules and by-laws of the municipal corporations where the Company intends to establish its works.—G. A. GEOFFRION.'

"This opinion was submitted by Attorney J. N. Greenshields: 'Section 5 of the charter of the Standard Light and Power Company undoubtedly gives to that Company the right and power to lay its wires and pipes underground, as the same may be necessary for the purpose of supplying electricity and gas light, power and heating. This right was originally given and granted, subject in effect to obtaining the consent of the municipality, and, in the case of the city of Montreal, of the City Council, as provided by Section 25 of the act. This section being repealed, the absolute right remains subject to the only limitation of doing no unnecessary damage and providing all proper facilities for free passage through the streets, etc., while the works are in progress. The city have, under their charter, an undoubted right to regulate the manner in which said work of laying the pipes may be carried on; that is to say, that they might and may fix the place in the streets in which pipes may be put down, the depth and the length of street, say, which shall be open at one time; but their right under their charter does not seem to me to go any further. The charter of the city of Montreal and the charter of the Standard Light and Power Company emanate from the same Legislature. The charter of the Standard Light and Power Company is a charter subsequent to that of the city of Montreal, and both charters are clearly within the power of the Provincial Legislature to grant, and I do not see, upon a close reading of the acts, that the terms of the special acts are in any way repugnant to each other. The intention of the Legislature, to be gathered from a reading of the special acts of the Standard Light and Power Company, was manifestly to give this Company the right to lay gas pipes in the streets and public places, subject to the consent, in the first place, of the City Council, and by the amendment passed at the last session of the Legislature, this restriction is removed, and the right exists with no other restriction than that contained in Section 5, which grants the right, viz., not to cause unnecessary damage, and providing for the free use of the streets during the progress of the work of laying the pipes. It was manifestly the intention of the Legislature to grant to this Company the right to lay gas pipes, etc., in the streets and public places of the cities and towns of the Province of Quebec, without the said Company first obtaining the consent of the cities to do so. I cannot draw any other conclusion from the language of the statute itself. I am, therefore, of the opinion that the Standard Light and Power Company, under its charters, has power to lay gas pipes in the streets of the city of Montreal without the consent of the Council.'"

THE contract for lighting the U. S. Custom House, Nashville, Tenn., for the ensuing year has been awarded to the Nashville Gas Light Company. The buildings have for several years past been illuminated by electricity.

THE Board of Public Works, of Milwaukee, Wis., have received the following bids for the public lighting of that place: The American Welsbach Street Lighting Company, Welsbach system (55-candle power burners), 3-year contract, $28.50 per lamp per year; 5-year contract, $28 per lamp per year. Milwaukee Gas Light Company: 3 year contract, 5-foot burner, $21.25 per lamp per year; 3 year contract, 6-foot burner, $24.25 per lamp per year; 5-year contract, 5-foot burner, $20 per lamp per year; 5-year contract, 6-foot burner, $23 per lamp per year. Under the present contract, which is for 5 years, the city paid $22 per lamp per year for 5-foot burners, and $25 a year for 6-foot burners. About 85 per cent. of the lamps in use are equipped with 5-foot burners.

THE St. Paul (Minn.) Board of Equalization has reported that the franchise of the St. Paul Gas Company, for purposes of local taxation, should be assessed at $250,000, and that its property and machinery should be assessed at $150,000. The Company admits that its property of all kinds, as submitted in its return to the Board, should be assessed on the basis of $259,940.

THE new holder which is being constructed for the Buffalo (N. Y.) Gas Light Company by Messrs. R. D. Wood & Co., of Philadelphia, will be completed by November 1st. The vessel, which is intended for the better gas supply of North Buffalo, is rated for a capacity of 1,500,000 cubic feet.

THE Cincinnati *Post* had this to say some days ago: "Rumors have been afloat at St. Bernard to the effect that the Fuel Gas Company which was granted a franchise on June 18th for the manufacture of fuel gas would not build the plant. The object in securing the right, it was stated, was to sell it to a rival Company. Under the ordinance, as passed, the Company was required to begin active operations on the plant within 90 days, which ends September 18th. No work has yet been done at St. Bernard. A *Post* reporter called on Engineer John W.

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Hill and told him of the rumors afloat. Laughingly, he said: 'We have more than five weeks left to begin, and in that time I will be busy producing plans. In every gas plant it is customary to proportion the works according to the leading product, and, as a matter of course, we shall do the same. But we have not yet decided whether coke or fuel gas will be our leading product, and until a decision can be reached in that respect we cannot begin work on the site. You can say that the gas plant will be built as soon as possible, and that St. Bernard citizens need not be afraid that our Company secured a franchise under false pretenses.'"

THE authorities of Windsor, Ontario, are considering the feasibility of imposing a tax on each meter placed by the Gas Company.

SOME days ago two suits for $5,000 each were begun, through Attorney Frank H. Jackson, against the Providence (R. I.) Gas Company, for the deaths of Catherine Hart and Mary Kelleher, who were suffocated by gas some time ago in a house on Friendship street, where they were boarding with a Mrs. Scott. The gas leaked from some pipes, and, entering the house, seriously affected nearly all who were living there.

THE old Brooklyn works have been put out of action, in accordance with the expressed policy of the Brooklyn Union Gas Company to consolidate its system of manufacture.

AT the last meeting of the French Society of Gas Engineers M. Leon Soubivan described a method of repairing cracks in retorts while in use. He first sprays the part affected with water under high pressure, and then he sprays on a milk of cement with $\frac{1}{20}$ part of borax. This adheres well, and after specially attending to the larger cracks, he gives the whole interior a general coating, by means of the spray, so as to fill up any fine cracks there may be. The coating so laid on is not as hard as either the retort itself or the deposit of carbon, so that the carbon may be chipped off with the greatest ease and without removing any part of the substance of the walls of the retort.

Mineral Wool.

Consul Merritt, at Barmen, Rhenish Prussia, says that of those who know mineral wool, or silicate of cotton, as it is sometimes called, probably only a small number are familiar with the simple process by which it is made. The wool itself, serving a variety of useful purposes, as a non-conducting covering against heat and cold, alike for steam pipes and cold storage room walls, as a sound deadener in floors of buildings, and as a means of fireproofing is, as its name implies, a soft and woolly substance, consisting of a mass of very fine mineral fibers interlacing one another in every direction, and thus forming an endless number of minute air cells. The wool appears on the market in a variety of colors, principally white, but often yellow or grey, and occasionally quite dark, and is made by converting scoriæ and certain rocks, while in a molten state, into a fibrous condition by a steam blast directed against the liquid material. Blast furnace slag forms the raw material for one variety of the wool, and sandstone for another, yielding respectively slag wool and rock wool, the latter being preferable for pipe covering, because of the absence of sulphur, which, with moisture present, becomes an active corroding agent. The furnace slag or the rock, as the case may be, is melted in a large cupola, and as it trickles out at the tap hole in a somewhat sluggish stream it meets a high pressure steam jet, which atomizes the woollen material, if it may be so termed, blowing it in fleecy clouds into the storage room provided for it. Soft and downy, the stuff settles wherever a resting place offers itself, the heavier wool coming down first, while the lighter portions are blown further along by the force of the steam, and settle in the more distant parts of the room. The material thus naturally grades itself into varieties of different qualities. A thousand pounds of wool per hour are turned out by one of the cupolas, and after the storage room has been blown full, the flocculent mass is pressed into bags, ready for the market. The whole process, says the Consul, affords an admirable and interesting illustration of the utilization of a formerly waste product.

A New Incandescent Lamp.

An exchange says that a new filament for incandescent lamps has been described as made of hygroscopic asbestos paste which, after being made in sheets .3 mm. thick, is cut into strips 6 cm. wide, and impregnated with a 30 per cent. solution of platinum chloride. It is then passed through a saturated solution of sal-ammoniac, dried in hot air, and then heated in a Bunsen flame, which converts the platinum solution into a platinum sponge. It is further impregnated with a 20 per cent. solution of magnesium chloride and heated, which process is repeated until the plate is covered with a uniform coating of magnesia, and it is finally dipped into a 10 per cent. solution of cerite nitrate. The magnesium coating protects the platinum, and the light-radiating properties of the cerite metals are much greater than those of carbon.

The Market for Gas Securities.

The improvement in city gas shares noted last week was in a measure maintained. Consolidated sold up to 144, for some small lots, but to-day (Friday) the market for it came in easier, the opening having been recorded at 141 to 141½. The regular dividend of 2 per cent., out of the earnings for the last quarter, was declared. It is payable Sept. 15. The transfer books close to-morrow. Other city shares are higher, with quite a fair demand for New York and East River common. Equitable is also in some request. Brooklyn Union sold yesterday at 81⅛, and 80 was bid for it at the opening to-day. These shares are very cheap at the ruling quotations. Chicago gas is weak, at 51½ to 51¾. There is a very pronounced short interest in this stock, and it is quite in the bounds of possibility that the shorts will experience a hard time of it when the hour for covering is at hand. San Francisco gas is decidedly easier, at 87, or thereabouts, the weakness no doubt being attributable to realizing sales. Laclede issues are dull and featureless, and Bay States are neglected. The market generally is somewhat of a puzzle, but we think gas share values have been forced as low as it was possible to drive them.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

AUGUST 24.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,480,000	100	141	141½
Central	500,000	50	150	..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	185	190
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	212	215
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	79	80½
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	26	28
Preferred	2,000,000	100	.	60
Bonds 1st 5's	3,500,000	1,000	94	97
" 1st Con. 5's	1,500,000	..	82	86
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	71	76
Preferred	5,000,000	100	100	103
Bonds, 1st Mortgage, 5's	1,500,000	1,000	107	111
Yonkers	299,650	50	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	80	84
" " Bonds (5's)	15,000,000	1,000	100	101
Bay State	5,000,000	50	16	18
" Income Bonds	2,000,000	1,000	30	32
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	75	80
2d " " "	3,000,000	1,000	60	62
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co.	25,000,000	100	51½	51¾
Chicago Gas Lt. & Coke Co. Guaranteed Gold Bonds	7,650,000	1,000	94	94¼
Columbus	1,069,000	..	..	65
1st Mortgage	1,085,000	..	..	96
Consumers, Jersey City	2,000,000	100	..	78
" Bonds	600,000	1,000	97½	99
Cincinnati G. & C. Co.	7,000,000	100	196¾	197
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	41
Bonds (6's)	150,000	1,000	..	..

Consolidated, Baltimore....	1,000,000	100	55	58
Mortgage, 6's.....	3,600,000	..	107	107½
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910.000	..	..	..
Consolidated, 1st 5's.....	1,490,000	..	..	..
Detroit	4,000,000	..	32	33
" Con. Bonds.....	4,312,000	..	..	82
Equitable Gas & Fuel Co., Chicago, Bonds.....	2.000.000	1,000	..	101
Fort Wayne	2,000,000	..	..	85
" Bonds.....	2,000,000	.	..	88
Hartford.....	750,000	25	..	145
Indianapolis.....	2,000,000	..	115	120
" Bonds, 6's.....	2,650,000	..	98	101
Jersey City.....	750,000	20	180	..
Lafayette Gas Co., Ind.....	1,000,000	100	..	92½
Bonds	1,000,000	1,000	85	90
Louisville.....	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	19	19½
Preferred.....	2,500,000	100	75	76
Bonds	9,034,400	1,000	87	88
Little Falls, N. Y.....	50,000	100	..	100
Bonds.....	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.....	1,000,000	..	98	98
Bonds, 6's	4,000,000	..	123	..
New Haven.....	1,000,000	25	225	..
Oakland, Cal.....	2,000,000	..	52	53¼
" Bonds.....	750,000	..	..	..
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage....	2,100,000	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City.....	500,000	50	..	175
Paterson, N. J.....	.....	25	99	102
Rochester Gas & Elec. Co..	2,150.000	50	..	..
Preferred.....	2,150,000	50	83	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10.000,000	100	86½	87
St. Paul Gas Light Co.....	1,500,000	100	67½	70
1st Mortgage, 6's.....	650,000	..	84	87
Extension, 6's.....	600,000	..	..	..
General Mortgage, 5's .	2,400,000	.	88	90
Syracuse, N. Y.	500,000	25	..	..
Washington, D. C.....	2,000,000	20	250	..
Western, Milwaukee.....	4,000,000	100	..	60
Bonds, 5's.....	3,556,000	.	..	90
Wilmington, Del.....	500,000	50	180	182

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DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, Aug. 13, 1896.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable on Sept. 10, 1896, to stockholders of record at the close of business Aug. 29. The Transfer books of the preferred stock will be closed from Aug. 31 to Sept. 10, both inclusive. Checks will be mailed,

1107-3 EDWARD C. LEE, Treasurer.

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By a man 34 years of age. Sixteen years' experience in the manufacture and distribution of Coal Gas as Supt., and four years in the Electric line. Thoroughly competent to take charge of any plant, separately or combined. A practical mechanic, and understands the erection of gas plants and everything pertaining to the business. Not afraid of work. Salary no object until ability is proven. Best of references.
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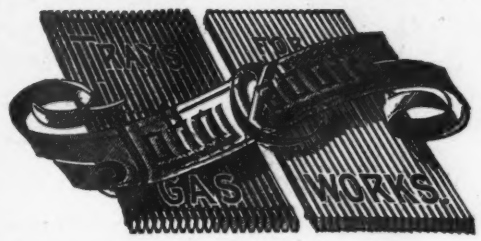

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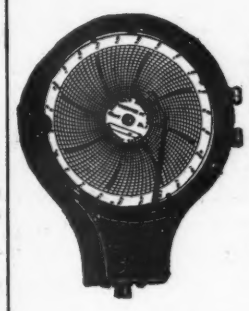

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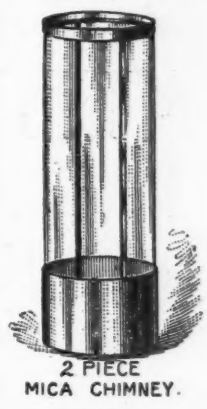

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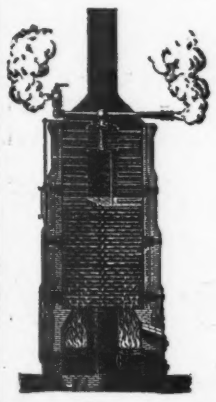

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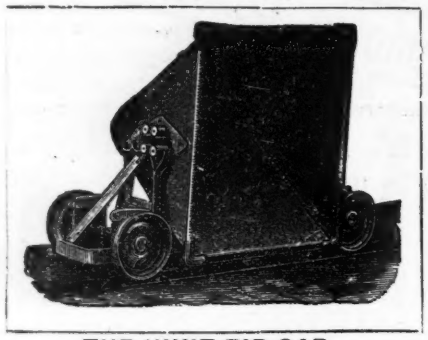

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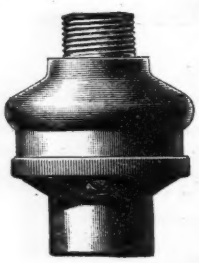

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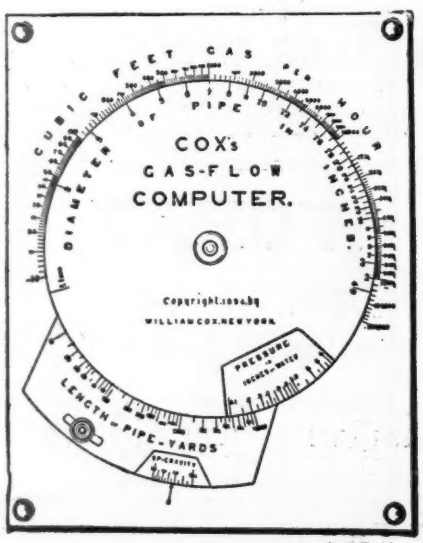

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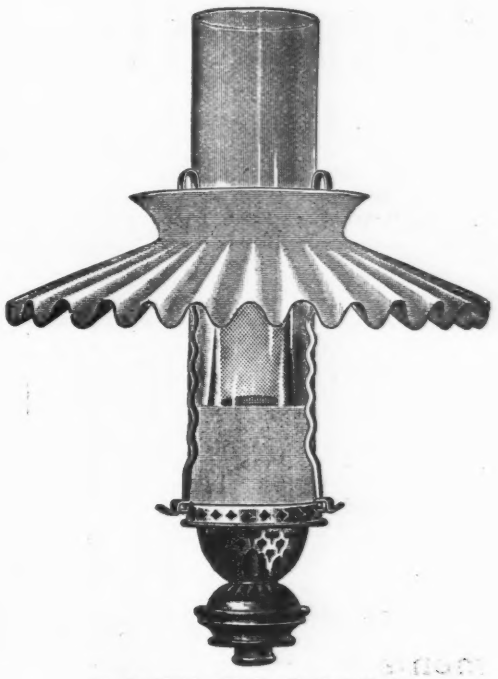

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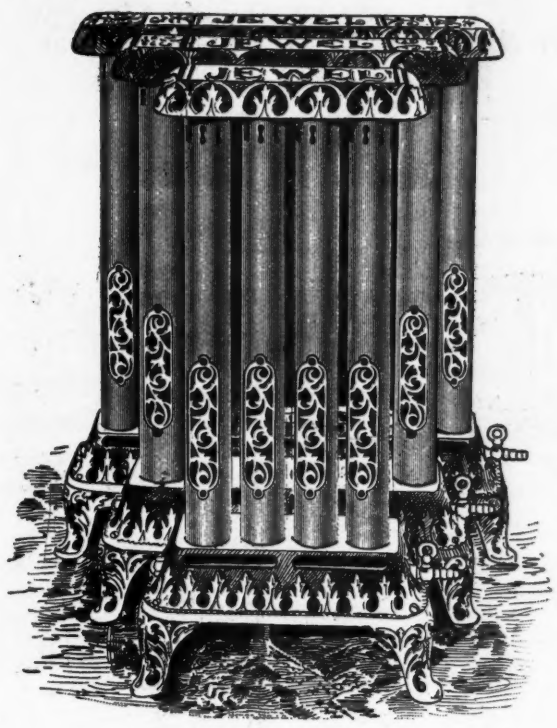

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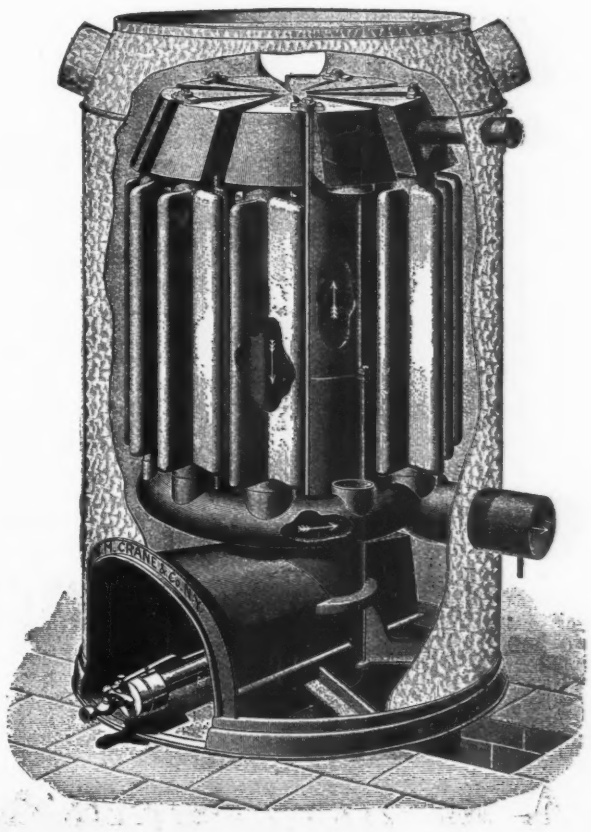

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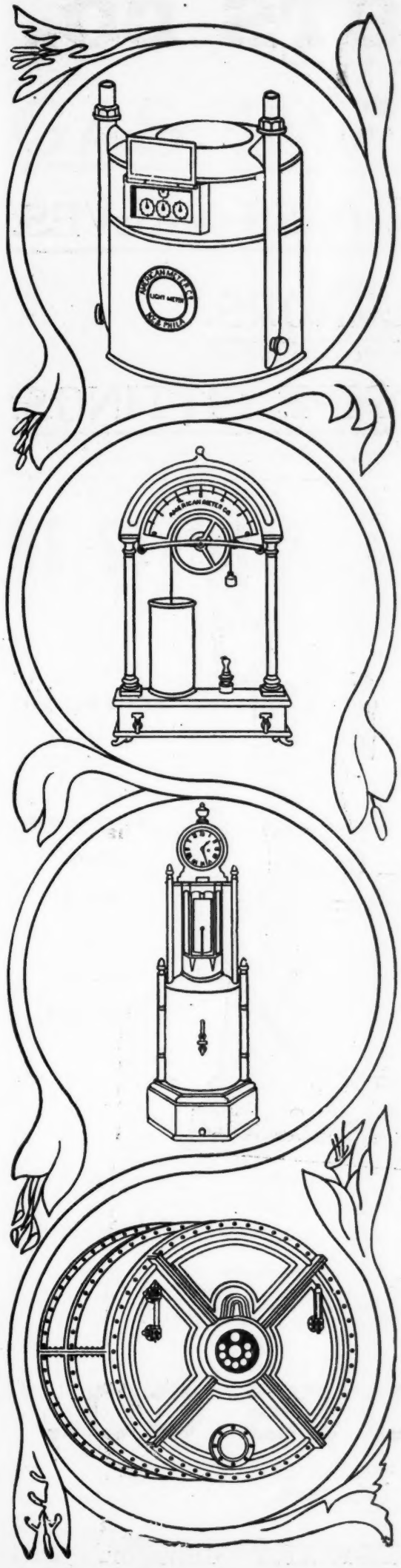

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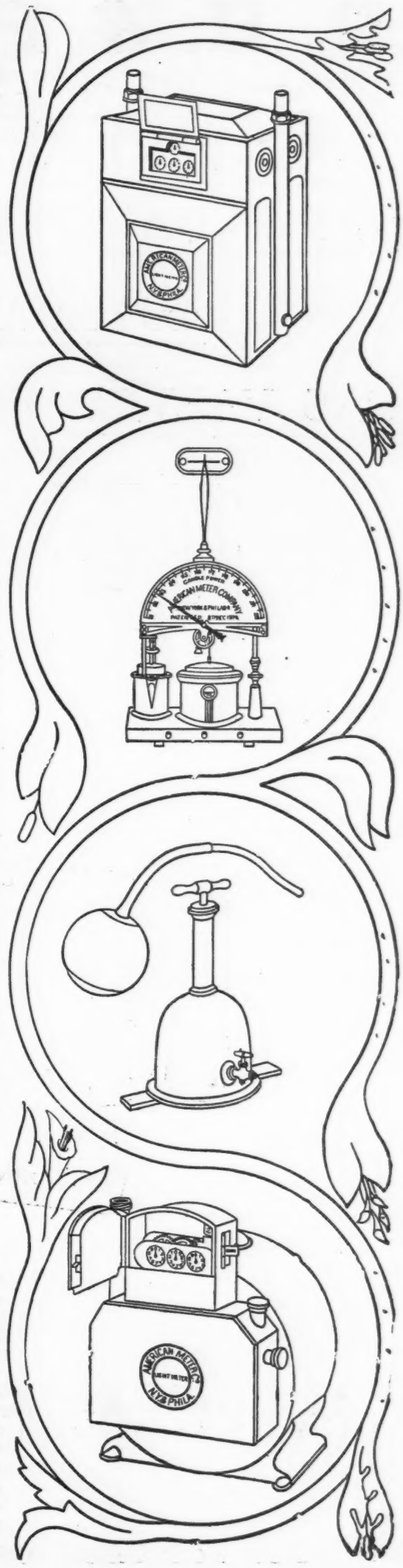
PUBLIC LIGHTING TABLE.

SEPTEMBER, 1896.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	7.00 PM	12.30 AM	6.30	4.20
Wed.	2	7.00	1.30	6.30	4.20
Thu.	3	7.00	2.40	6.15	4.30
Fri.	4	7.00	4.30	6.15	4.30
Sat.	5	7.00	4.30	6.15	4.30
Sun.	6	6.50	4.40	6.15	4.30
Mon.	7	6.50 NM	4.40	6.15	4.30
Tue.	8	6.50	4.40	6.15	4.30
Wed.	9	6.50	4.40	6.15	4.30
Thu.	10	6.50	4.40	6.05	4.40
Fri.	11	6.50	4.40	6.05	4.40
Sat.	12	8.10	4.40	6.05	4.40
Sun.	13	9.00 FQ	4.40	6.05	4.40
Mon.	14	10.00	4.40	6.05	4.40
Tue.	15	11.10	4.40	6.05	4.40
Wed.	16	12.10 AM	4.40	6.05	4.40
Thu.	17	1.20	4.40	5.55	4.50
Fri.	18	2.20	4.40	5.55	4.50
Sat.	19	3.30	4.40	5.55	4.50
Sun.	20	No L.	No L.	5.55	4.50
Mon.	21	No L. FM	No L.	5.55	4.50
Tue.	22	No L.	No L.	5.55	4.50
Wed.	23	6.20 PM	7.20 PM	5.55	4.50
Thu.	24	6.20	7.50	5.40	5.00
Fri.	25	6.20	8.10	5.40	5.00
Sat.	26	6.20	8.50	5.40	5.00
Sun.	27	6.10	9.30	5.40	5.00
Mon.	28	6.10	10.20	5.40	5.00
Tue.	29	6.10 LQ	11.20	5.40	5.00
Wed.	30	6.10	12.20 AM	5.40	5.00

TOTAL HOURS LIGHTING DURING 1896.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	220.40	January	423.20
February	207.00	February	367.40
March	193.00	March	355.35
April	174.10	April	298.50
May	164.00	May	264.50
June	142.10	June	234.25
July	142.10	July	243.45
August	150.50	August	280.25
September	163.00	September	321.15
October	193.10	October	374.30
November	207.00	November	401.40
December	237.30	December	433.45
Total, yr.	2194.40	Total, yr.	4000.00



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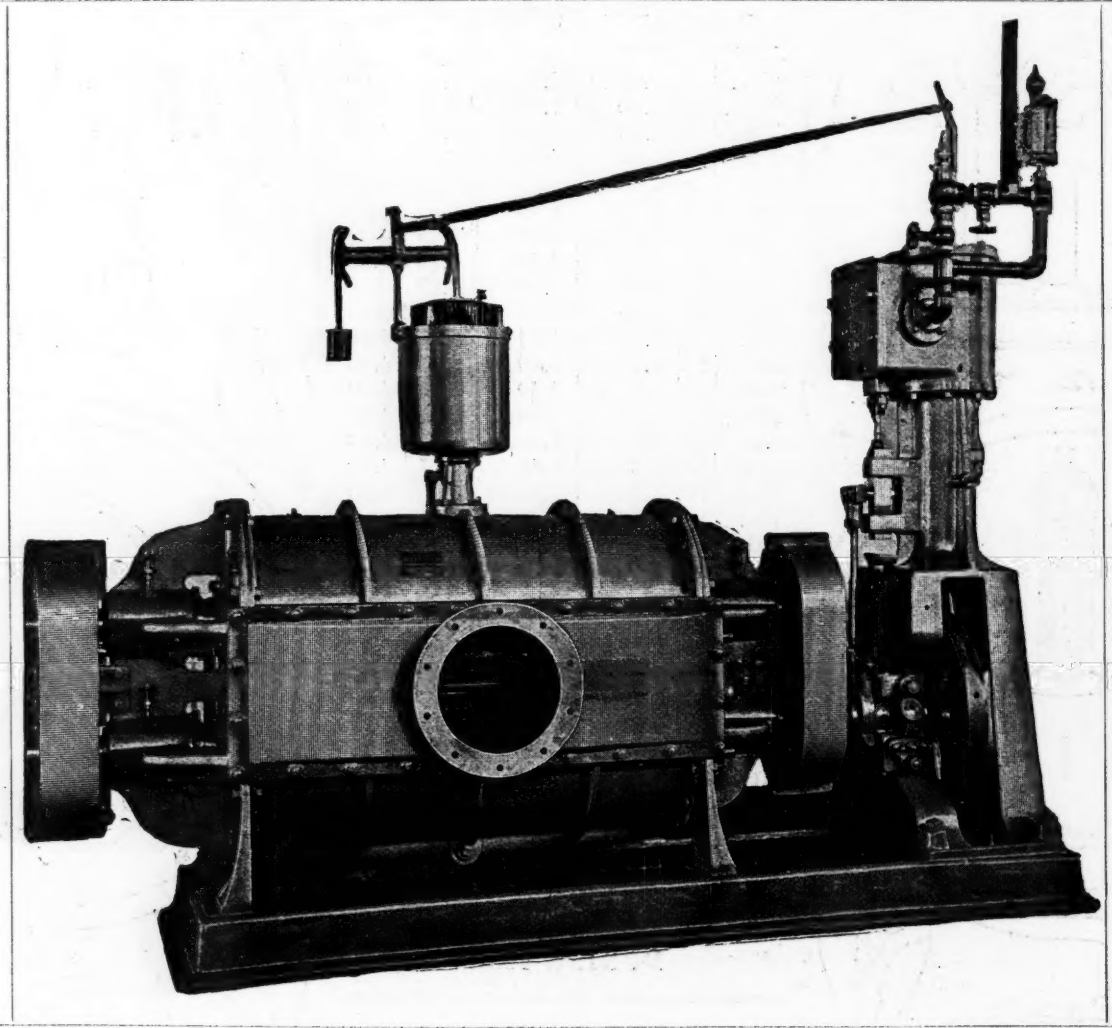

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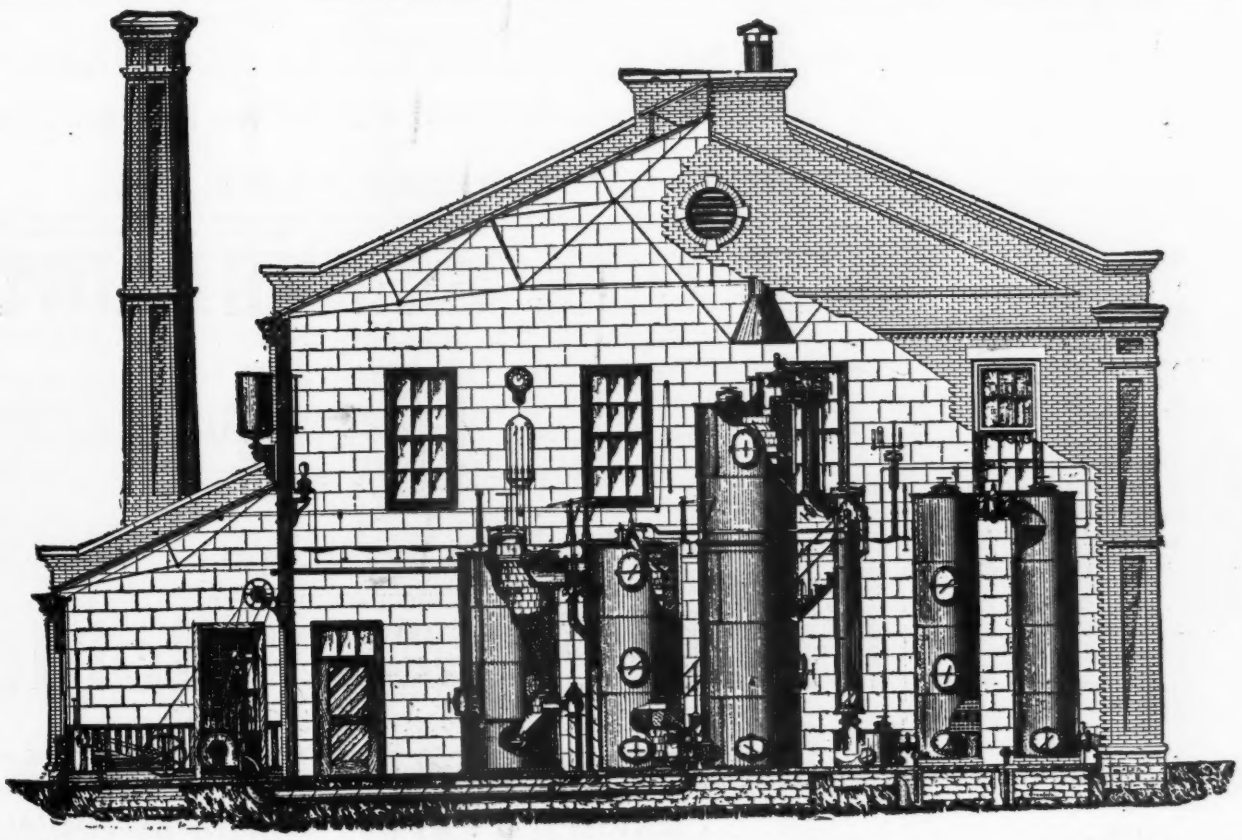

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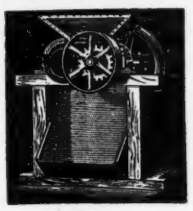

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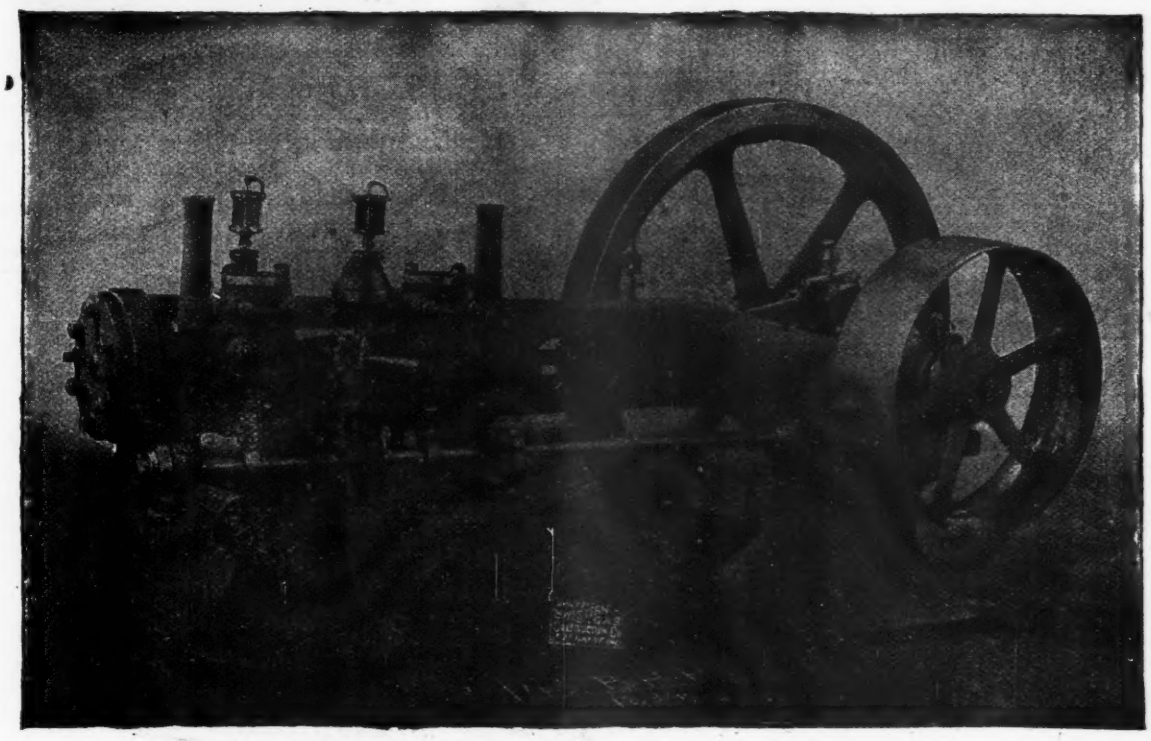

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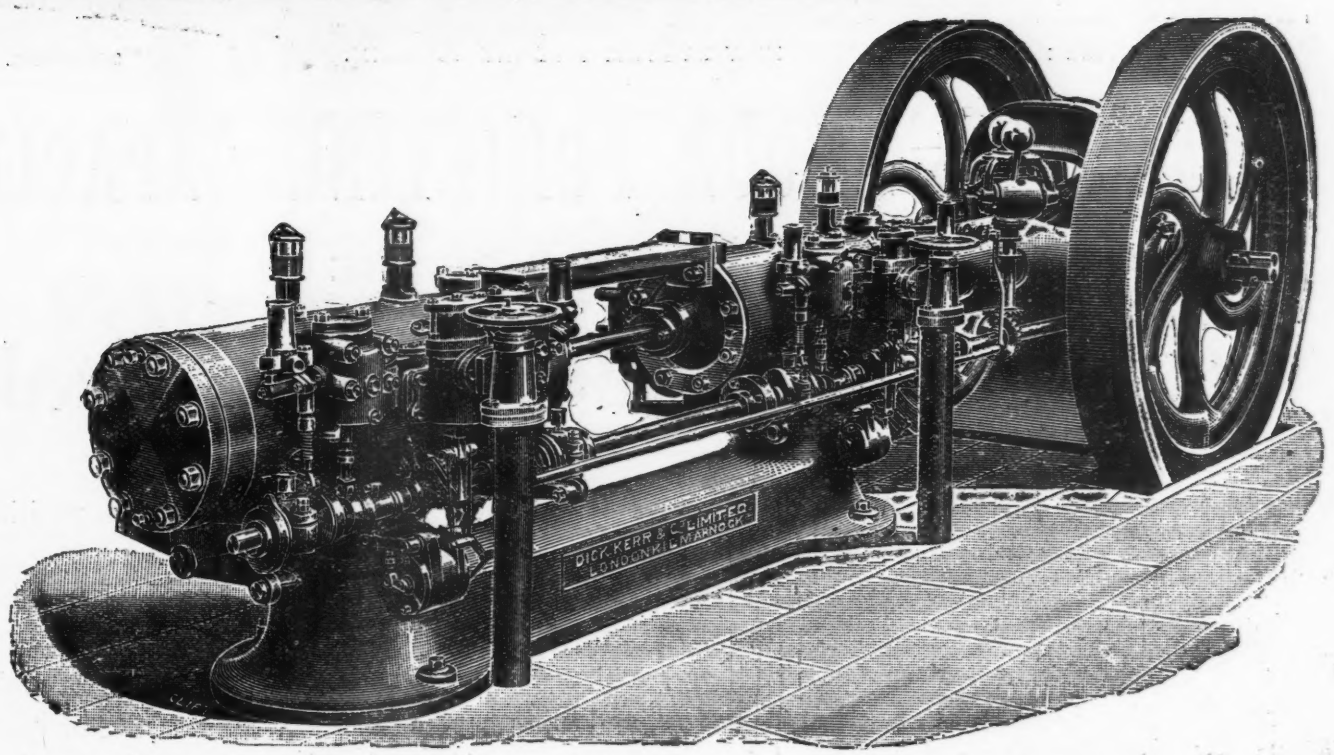

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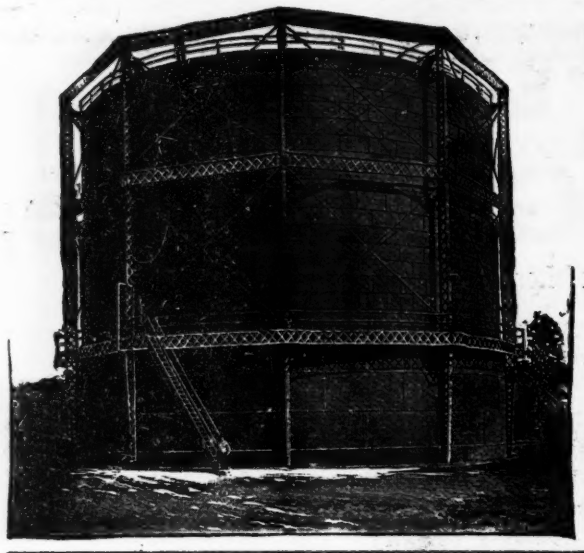

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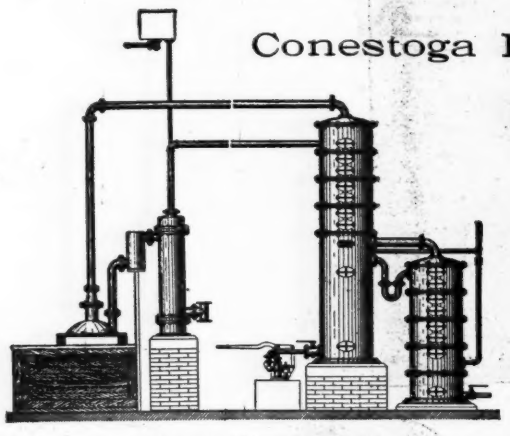

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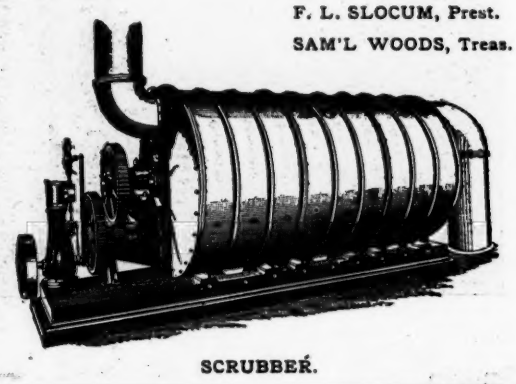

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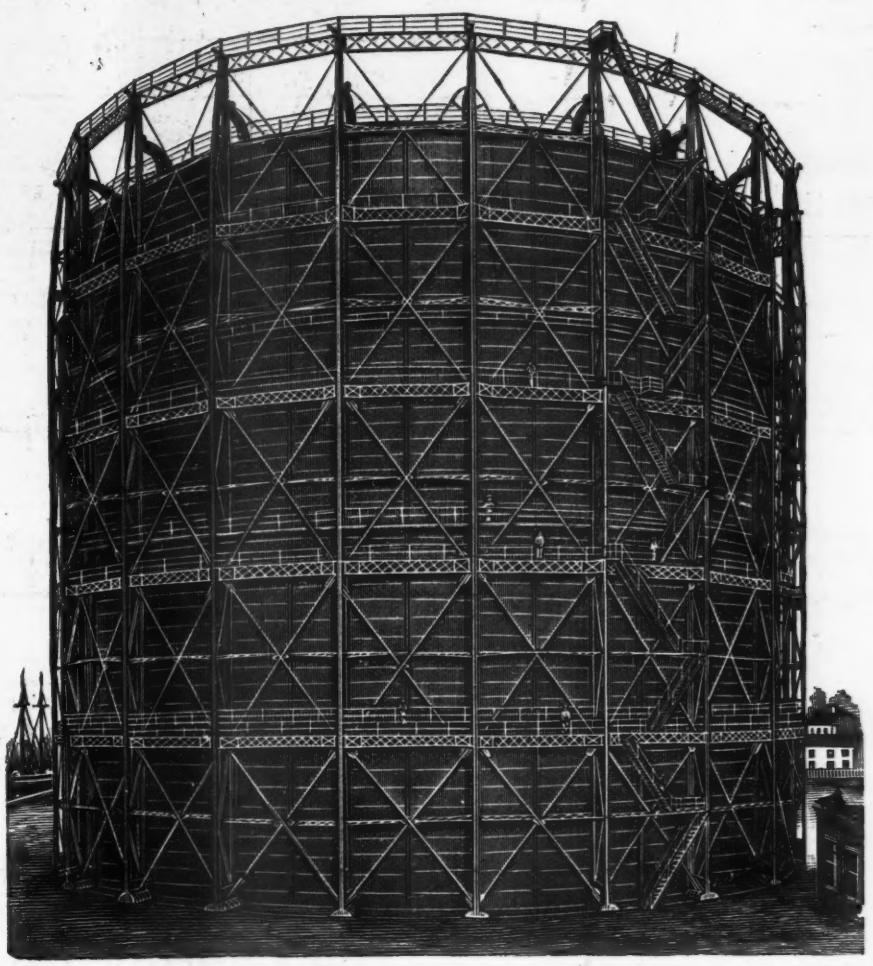

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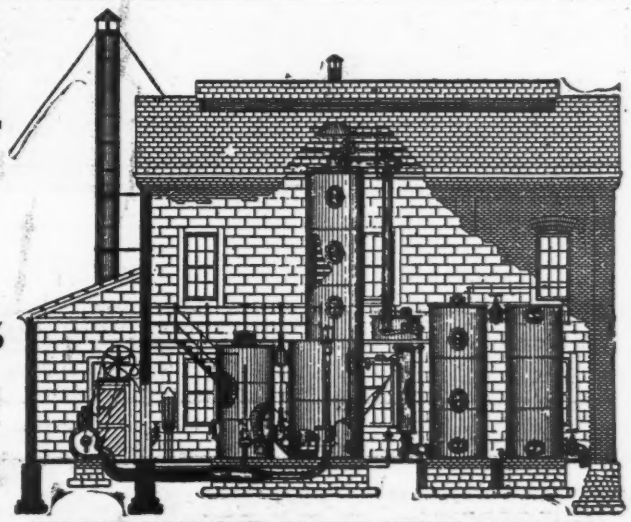

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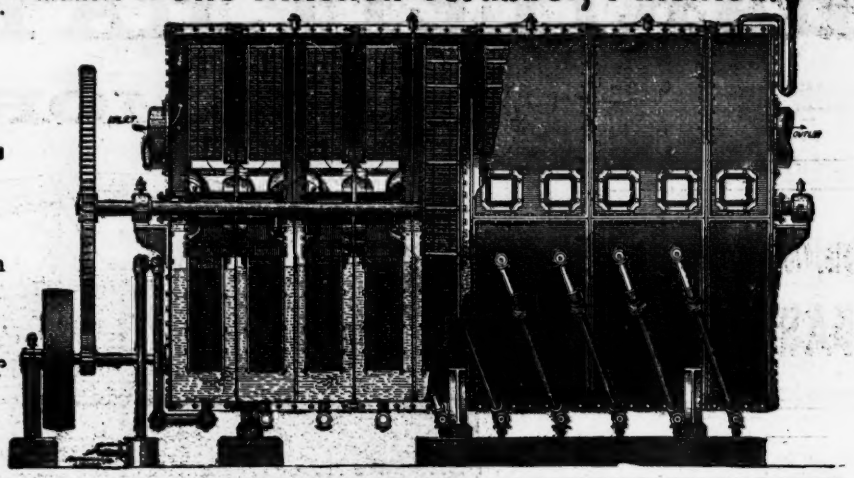

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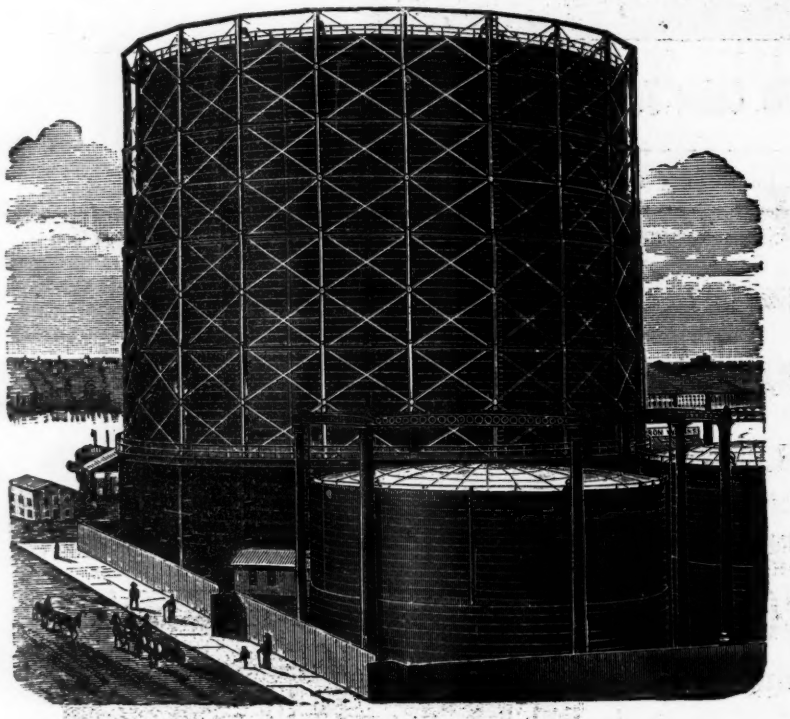

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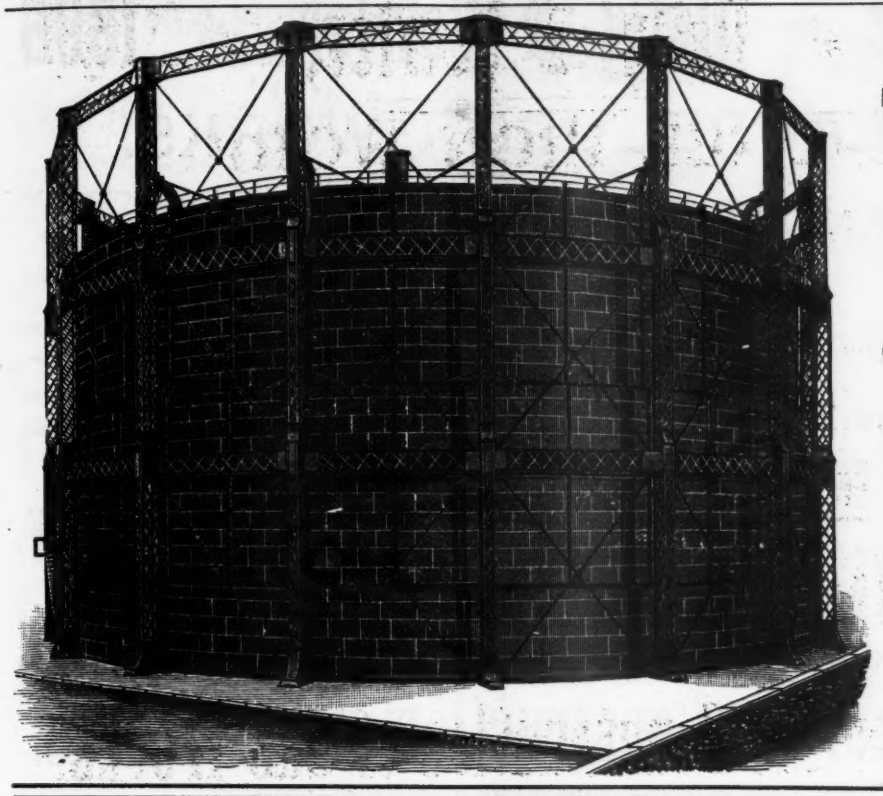

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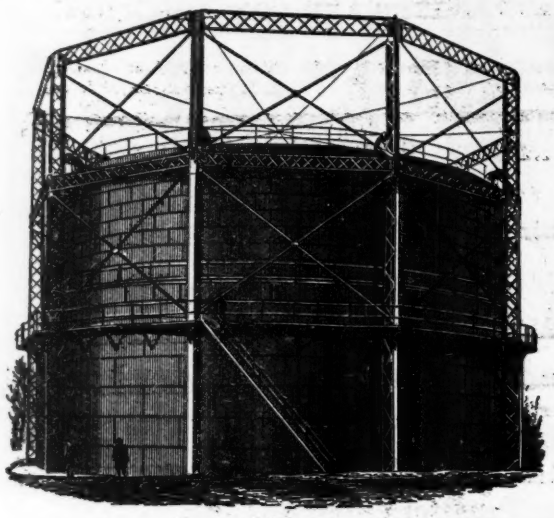

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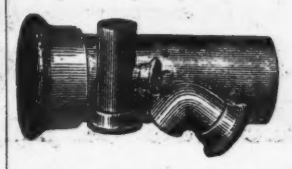

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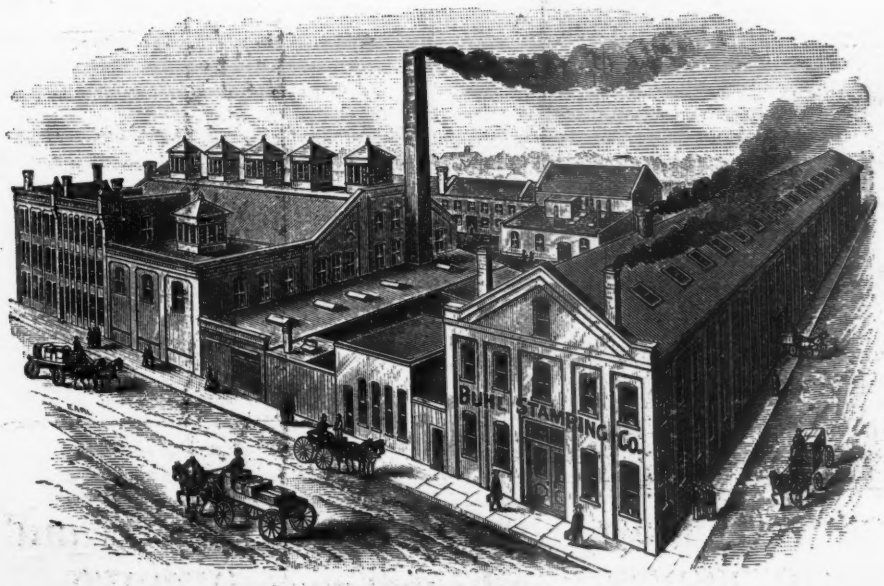

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